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TABLE OF CONTENTS

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ORIGINAL ARTICLES

Differential Diagnosis of Acute Abdominal Conditions in Childhood. By James S. Stone, M.D., Boston.....	303
Diverticulitis of the Cecum, with Report of Three Cases. By Ralph W. French, M.D., F.A.C.S., Fall River, Mass.....	307
Drop Wrist—Traumatic and Bilateral. By Everett Monroe Ellison, A.B., A.M., M.D., Washington, D. C.....	309
Determination of Standard (Basal) Metabolism of Patients by a Recording Apparatus. By Professor August Krogh, Copenhagen.....	313
Who Should Be "Pay Clinic Patients"? By Robert E. Chadock and Michael M. Davis, Jr., New York City.....	317
Congress of the International Surgical Society in London.....	321

EDITORIALS

Bulletins Relating to the Illnesses of Prominent People.....	329
Resident and Travel Scholarships for Physicians.....	330
Death Rate of Metropolitan Life Insurance Policy Holders.....	330
Advances in Diabetic Treatment.....	330
The Influence of Temperature on the Toxicity of Insulin.....	331

MISCELLANY

Notes from the Boston Medical Library.....	331
The Prendergast Preventorium.....	332
Child Health Care in France.....	332
The History of the Massachusetts Medical Society.....	332
Diabetic Column—Plenty of Insulin.....	333

News Items.....	333
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OBITUARY

Mary Almira Smith, M.D.....	333
Death Notices.....	334

NOTICES

Diagnosis of Typhoid Fever.....	334
Program of Child Hygiene Section of American Public Health Association Meeting.....	334
Society Meetings.....	334

Original Articles.

DIFFERENTIAL DIAGNOSIS OF ACUTE ABDOMINAL CONDITIONS IN CHILDHOOD.*

BY JAMES S. STONE, M.D., BOSTON.

In the diagnosis of acute abdominal conditions in children there is nothing more important than the history, and oftentimes there is nothing more difficult to obtain than a complete and accurate history. A correct diagnosis cannot be inconsistent with a correct history. If the two are inconsistent, either one or the other must be wrong.

Acute appendicitis is of course one of the most common of the conditions demanding surgical interference. Certain anatomical conditions may cause an acute appendicitis to be overlooked. In children the caecum, and consequently the appendix, are more freely movable than in the adult because of the relatively longer meso-caecum. The appendix also is relatively longer in a child. Thus the inflammation of acute appendicitis may start away from McBurney's point, and very often starts in the pelvis which, in a child, is so small that suprapubic pressure may not cause pain.

It has been stated that one of the two func-

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tions of the consultant is to make a rectal examination. If this function was usurped by the attending physician, the need of the consultant would be greatly diminished.

In those cases in which the appendix lies within the pelvis, symptoms referred to the bladder or rectum, or both, are not uncommon. Pain on micturition or voluntary retention of urine, or constipation due to unwillingness to allow a movement, or possibly a diarrhea due to irritation of the rectum may be among the symptoms noted.

In cases of pelvic appendicitis which go on to abscess formation, it is not at all uncommon for the abscess to appear on the left side. When the abscess has filled the pelvis the path of least resistance may be up along the rectum and sigmoid.

The extracaeal appendix, if inflamed, usually causes very marked localized tenderness, spasm and swelling just above the iliac crest, with very little, if any, tenderness at McBurney's point.

The appendix which lies behind the caecum between the layers of the mesocaecum is rare, but a location just inside the mesocaecum, behind the caecum and the loops of the ileum, is common. Appendicitis in this location is particularly dangerous because during the early stages of the inflammation the tenderness is masked by the air cushion in the overlying bowel, and because perforation, if it occurs, may

involve the most dangerous portion of the peritoneal cavity.

I have spoken of the conditions under which appendicitis may be overlooked. There are many conditions which are often mistaken for appendicitis. Most important are those which arise above the diaphragm. Pneumonia, with its associated pleurisy, endocarditis and pericarditis, may all give rise to the suspicion of appendicitis, because the pain of these conditions is often referred to the abdomen and because there is often in these conditions a spasm of the abdominal muscles.

Moreover, vomiting often occurs. The diagnosis of these conditions is particularly difficult when the usual signs are absent. Great importance must then attach to the incidental signs. In pulmonary conditions the rate and character of respiration, the presence of any cyanosis, the action of the auxiliary muscles of respiration, must all be noted. In cardiac conditions the rate and character of the pulse, the character of the heart sounds and any pallor or cyanosis must also be noted. In any thoracic condition and particularly in any acute pulmonary infection, the temperature is usually higher than is to be expected in acute appendicitis. The leucocytosis also is usually higher in the acute pulmonary infections than it is in appendicitis. This is specially true if we exclude those acute cases of appendicitis in which the physical signs are pretty clearly defined.

Abdominal pain and spasm of the abdominal muscles seem to occur particularly in those cases in which the disease is near the diaphragm. The frequency with which empyema is noted in the cases which show early abdominal pain, suggests the probability of a rather early and severe pleural infection.

In thoracic conditions the abdominal spasm is to be explained as an attempt to prevent pain by limiting motion in the diaphragm and chest wall.

In abdominal conditions muscular spasm is to be explained as an attempt to limit abdominal movement, and also prevent pressure on an underlying tender spot.

In the first condition, the examiner's fingers may, if moved very slowly and carefully, palpate the abdomen freely, the immobility of the hand causing a relaxation of the muscular spasm. In the second condition spasm increases as the muscles attempt to prevent the fingers from pressing on a tender spot.

It is essential to recognize that before examination is made by palpation as much as possible be determined by inspection. Often nearly as much can be learned by watching as by feeling in regard to muscular spasm, and occasionally in regard to abdominal tumors. Children are less likely to cry, too, if looked at than if touched.

Among the abdominal conditions leading to a mistaken diagnosis of appendicitis, the most

common is pyelitis. There are also the more severe haematogenous infections of the kidney. The urine usually is a guide to the diagnosis. Occasionally in very severe infections there is a suppression of urine in the affected kidney. But always in these cases there is localized tenderness in the costo-vertebral angle. Usually in the renal infections the fever and constitutional disturbance is greater than in appendicitis.

Numerous other abdominal conditions may simulate appendiceal abscess.

Enlargement of the lymphatic glands is a common condition. Tuberculosis, sarcoma and Hodgkin's disease, typhoid fever and acute infections may produce glandular enlargement, just as appendicitis may also cause it.

The lymph glands are numerous in the mesentery of the lower ileum and caecum, and of course there is a large amount of lymphoid tissue in Peyer's patches.

Tuberculous lymphadenitis is always secondary to tuberculosis elsewhere. The mucosa of the bowel, disease of the hip, spine or pelvis may cause involvement of the glands and infiltration in the adjacent tissues, but the location of the glands, whether along the spine, in the mesentery, or along the iliac vessels, will depend on the primary location of the infection.

Tuberculous mesenteric lymph glands may cause a very definite tumor. The smaller glands usually make a nodular bunch, often located in the right iliac region. Occasionally a tuberculous mesenteric gland breaks down and forms a large tuberculous cyst. Unless adhesions have formed about it, such a cyst in the mesentery of the small bowel may be moved somewhat from side to side, but usually cannot be moved up or down owing to the attachment of the mesentery along the spinal column. Exactly the reverse of these conditions would be true of a tumor in the mesentery of the transverse colon. The x-rays show us the frequency of calcified lymph glands otherwise not suspected.

Lymphosarcoma or Hodgkin's disease is seldom confined to the retro-peritoneal glands. I have seen the glandular enlargement of an acute lymphatic leukemia originate in the iliac glands in a girl of fourteen.

Typhoid fever may be associated with marked glandular enlargement even so early that the Widal reaction is still negative. I remember very well opening onto a mass of typhoid glands, in all the size of a goose egg, some of the individual glands the size of a horse chestnut.

Acute infections may involve the iliac glands and not uncommonly there may be the formation of an extraperitoneal abscess in the iliac fossa close above Poupart's ligament, away from the course of the iliac vessels.

Never forget Pott's disease. The girdle pains referred to the anterior abdomen, and due to pressure at the point of exit from the spine are

as definite as are the pains of locomotor ataxia or lead poisoning. The latter conditions are hardly to be expected in childhood, but Pott's disease is relatively common and may be associated with considerable spasm, and not infrequently with a lumbar, iliac or psoas abscess. X-rays show how common are these abscesses, often not noted clinically.

There was formerly a saying at The Children's Hospital that obscure abdominal conditions in children were due to tuberculous peritonitis. Of recent years, fortunately, surgical tuberculosis has been less frequent and less severe than formerly. There is much truth, however, in the saying just quoted.

If the obscure lesion is associated with a low white count and a positive Pirquet reaction it is particularly likely to be true. Of course the value of the Pirquet reaction depends considerably on the age of the child, but a negative reaction is of great significance. In a number of instances a disregard of the negative Pirquet has led to a mistaken diagnosis. Experience in this matter has later led to certain correct diagnoses which would not otherwise have been made.

In tuberculous peritonitis the cases may be divided roughly into those with inflammatory masses and into those with ascites. Of course there is every gradation between these two types, but essentially we have to differentiate the tuberculous masses from other solid tumors, and to differentiate the ascitic type from other conditions which produce fluid in the abdomen.

A common characteristic of the solid inflammatory tuberculous mass is the rather sharp and irregular border of the tumor. The tuberculous masses do not appear in any particular location nor do they correspond in position with what would be expected in a solid tumor of any special organ. The tuberculous masses may be multiple and of any size and shape.

In the absence of new growths, free fluid in the abdomen is usually due to tuberculous peritonitis, provided the history is consistent with such a condition, and provided the Pirquet is positive. There are, however, three conditions which simulate closely the ascitic type of tuberculous peritonitis. Cysts of the mesentery and retroperitoneal cysts originating about the kidney often reach such large size as to fill the abdomen so completely, and give such a definite fluid wave as to give rise to the belief that there is free fluid in the peritoneal cavity. In certain cases proper regard for the Pirquet reaction has established the correct diagnosis.

In some instances the presence of coils of intestine off at a side of the cyst has shown that the fluid was not free. In large mesenteric cysts, however, the loop of bowel beneath which the cyst originated is usually completely covered by the cyst which grows out from each side of the mesentery in an hour-glass shape.

Solid tumors of the omentum produce a very rapid ascites. The amount of fluid may be so great, and the abdominal wall may be so tense that it is not easy to feel the omental tumor underneath. The smooth, uniform surface of the omental mass is characteristic of the omental tumors seen at the hospital, and would make detection difficult on slow, gentle examination, although by a sudden thrust the hand might come down upon the solid mass.

Other new growths are not likely to cause so much ascites.

In the detection and differentiation of tuberculous peritonitis examination of the inguinal canal and of the scrotum is very important. If any hernial sac exists it may be studded with tubercles which can be readily felt. Tuberculosis of the epididymis or vas is not uncommonly associated with tuberculous peritonitis.

Among the solid tumors of the abdomen, sarcoma, especially of the kidneys, is common. Often of rapid growth, the tumor is seldom noticed until too far advanced for successful removal. Renal tumors usually are of rounded outline and almost invariably bulge back into the loin as well as push forward. The smooth surface of the mass is usually broken by the passage of the ascending or descending colon across its surface. Sarcoma, especially if rapidly growing, may be very soft, almost fluctuating. The presence of blood in the urine is in these cases almost certain confirmatory evidence of the nature of the tumor.

Experience has shown, however, that certain cases which were considered without much doubt to be hopeless sarcoma, were in reality benign cysts originating in embryonic tissue about the kidney, and could be readily removed. It is possible to say before exploration that a tumor originates in or close to the kidney, but it is seldom fair to say with positiveness that a tumor is an inoperable sarcoma without actually looking into the belly.

Hydronephrosis, pyonephrosis and perirenal abscesses are always to be considered. In these conditions the history of the illness is of the utmost importance.

While exploration is always to be advised, if there is any doubt at all it is but fair to add that exploration hastens death in cases of advanced sarcoma which cannot be removed.

Supra-renal tumors and neuroblastomas may at times be suspected by their metastasis, particularly to the flat bones.

Tumors originating in the pelvis are occasionally encountered in childhood. In girls ovarian cysts are occasionally found with pedicles of varying lengths. Salpingitis has also been met with in the hospital, but this of course is rare.

Rhabdomyoma originating in the bladder is occasionally seen in children. In one baby I have seen such a tumor develop to the size of the child's head in the course of six weeks.

Intussusception is of course the great surgical emergency in infancy. The short monograph by Clubbe of Sydney, Australia, should be read and re-read by every physician who treats children. Fortunately the symptoms of intussusception are absolutely characteristic. First is the sudden onset:—pain associated with shock. The abdominal pain is different from any pain the mother has ever seen the child have before. It is associated with pallor, cold sweat and reflex nausea or vomiting. The pain is not always constant, but often comes on in successive paroxysms. Between times the child may drop off to sleep.

The bowels may move perfectly normally after the onset of the pain. Later fecal matter does not appear in the movements, but as the bowel becomes pinched and the circulation becomes obstructed there appears first mucus, then blood stained mucus, and then blood. The vomiting at first reflex, later becomes the characteristic vomiting of intestinal obstruction. The pain, at first coming in sharp paroxysms associated with pallor and sweating, later becomes less severe but constant, and produces profound shock. In the later stages the toxic symptoms may become marked.

Students are always taught that there is a sausage shaped tumor in intussusception. It is essential to remember that the vast majority of cases of intussusception originate low in the ileum or at the ileo-caecal valve. The existence of some congenital abnormality as a Meckel's diverticulum or a fibroma in the lower ileum, or some thickening of Peyer's patches, are common causes of intussusception.

Most commonly for some reason or other the lowest portion of the ileum passes through the ileo-caecal valve, thus forming a tumor within the caecum which in turn is pushed along by the caecum. Thus in any case in the early stages the tumor passes up under the liver where it can be felt, if at all, only with difficulty. Later when the tumor has passed the hepatic flexure it may again be plainly felt in the central portion of the abdomen or to the left side.

In the more advanced cases still, the characteristic cervix like tumor can be felt in the rectum or even seen projecting from the anus, but in order to save many cases it is essential that the diagnosis should be made promptly.

Clubbe emphasizes again and again the importance of never disregarding the mother's story. She recognizes that the pain which the child has is different from anything the child has had before, and he urges strongly that in cases with a characteristic history, examination be made especially in the region under the liver, and if necessary be made with an anesthetic to secure relaxation. There is no surgical condition occurring in children in which hours count for more than they do in intussusception.

Something should be said regarding acute peritonitis which originates without a preceding

lesion of any abdominal organ. Pneumococcus peritonitis is the most common but there may be infection with the streptococcus or other organisms.

Little need be said of the overwhelming infections which involve peritoneum, pleura, pericardium, and meninges. But how are the peritoneal infections which offer hope of cure to be recognized promptly? The history is usually one of upper respiratory infection rather than of any abdominal disturbance. Then often suddenly comes the peritoneal involvement, causing pain and vomiting, and often distention. Pain and distention alone are not enough to warrant surgical interference. Localized tenderness must never be disregarded in these cases. An increasing general tenderness is of great significance. The accumulation of free fluid in the abdomen or the formation of a localized mass demand operative intervention. In these cases there is serious risk if any definite signs of localization, no matter how slight they are in degree, are ignored.

These cases of peritonitis without preceding abdominal lesion are the hardest in which to make an accurate diagnosis. There is one point demanding emphasis, which concerns the operating surgeon.

At the onset these infections are localized but usually the process is not limited by adhesions. Often the pus contains considerable fibrin. It never has the odor of colon bacillus pus. If the surgeon can learn to recognize these conditions the second he opens the peritoneum he may save patients who would otherwise be lost. With the finding of pus in the abdomen the first instinct of the surgeon is to put in a finger to discover the source of the infection. In cases in which the source of the infection is in the upper respiratory tract this attempt will always fail. The instant recognition of the fact that the infection is not associated with a local lesion, the avoidance of any exploration and the insertion of a drain, with absolutely no further procedure, are the points which make for success.

Of course the conditions found are not to be confused with those where there is an exudate around a foul localized abscess or in the presence of a tumor. These are matters which concern the diagnostic skill of the surgeon at the time of operation.

In conclusion I want again to urge certain things. First, listen patiently and thoughtfully to the story of the illness and ask questions which will bring out the whole truth as far as possible. If this is done, many conditions may be practically eliminated before the child is seen. Then see everything that can be seen and lastly feel all that can be felt, including what can be felt in the pelvis by rectal examination. If this is done, the second function of the consultant, to console the family, will less often be needed.

When the examination is finished, then consider the whole picture and the whole history. No undue emphasis is to be placed on any one feature, either of history or of examination, nor is any feature of either to be disregarded.

Then will come the need for the laboratory aids. The leucocytosis is often of tremendous aid. It can be determined very promptly. In cases not urgent, the Pirquet is of great aid, always of value if negative, of variable value if positive. The x-ray is of value in differential diagnosis in certain cases, but at times it involves dangerous delay and harmful manipulation.

Remember above all things that the correct answer to all medical problems must square with all the facts and, when found, the answer is usually perfectly plain.

DIVERTICULITIS OF THE CECUM, WITH REPORT OF THREE CASES.

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DIVERTICULITIS of the cecum is one of the rarer abdominal conditions which is seldom found in medical literature. It is, therefore, the purpose of this paper to call attention to the fact that diverticulitis does occur in the cecum and should be considered in the differential diagnosis of many cases of right-sided abdominal lesions.

The etiology, pathology and symptomatology of diverticulitis of the cecum are essentially the same as diverticulitis elsewhere in the colon so that the following general description applies to any location in the large bowel.

Diverticulitis was first given prominence in 1898 by Grasser, who described in particular the hyperplastic, stenosing type known as peridiverticulitis and noted its simulation to carcinoma of the sigmoid. Shortly afterward diverticulitis was extensively studied in America by Beer, Fisher and others who contributed to the etiology, and the Mayos, Wilson, Brewer and Griffin,¹ who contributed to the clinical aspects. Moynihan published the first case of peridiverticulitis in England in 1907, defining it as the Grasser tumor type. He emphasized the rôle of the diverticulum in causing non-malignant, vesico-sigmoid fistulae and its mimicry of carcinoma. The whole subject was then classified in 1908 by Telling² who correlated the pathological and clinical findings and presented the whole subject in detail. He divided diverticula into the *congenital* type such as Meckel's, which is composed of all three coats of the bowel, and the *acquired* type which is usually composed of the hernial protrusions of mucosa and serosa. In practice, diverticulitis has come to mean the in-

flammatory changes generally occurring in connection with the secondary, acquired, multiple, false diverticula of the large intestine.

It is not my intention to discuss the vexed question of etiology of the condition, but merely to note that modern opinion leads to the view that acquired diverticula of the whole intestinal tract owe their origin to similar tendencies and are but local variations of the same morbid process. These may briefly be summarized as follows: That diverticula are simple extrusions of the bowel wall at weak spots. That they occur in those parts of the small and large bowel where contraction of the muscle in the wall may be supposed to be especially vigorous with corresponding increase of pressure in the lumen, as in the last few inches of the ileum and lower part of the colon.

Lane³ considers the two factors in the development of a diverticulum are tension and fat, the infection being a natural sequence of stagnation of the contents in the diverticulum. Telling⁴ states that beyond doubt, they are largely if not entirely, due to increased pressure from within the bowel. Constipation, therefore, plays an important part; but he feels convinced that flatulent distention plays a rôle that cannot be overlooked. The apertures are often minute, 1/16 to 1/3 of an inch, and usually occur in two rows opposite the appendices epiploicae. They are often completely concealed by the folds of mucous membrane. On the outside they are seldom observed except by the trained eye because they mainly enter the appendices epiploicae, and the bowel in which they occur is very frequently fat laden, necessitating careful dissection to discover them.

Klebb⁵ was the first to associate sacculi of the large intestine and their formation with the vessels of the bowel wall. In 1898 this view was strongly supported by Grasser, who found small gaps in the muscular tissue through which vessels passed and in many instances was able to demonstrate small sacculi of the mucous membrane which pushed their way along the line of the vessels. This process may be likened to the formation of an inguinal hernia pushing its way along the course of the vessels and cord through the inguinal canal. The diverticulum remains a harmless pathological curiosity which gives rise to no symptoms until secondary processes supervene which, according to Telling,² occur in 60% of such cases.

Once a diverticulum is started the whole series of possible consequences may occur. It distends, harbors fecal material and then tends to undergo various secondary pathological processes in which analogy with appendicitis will help to prophesy the results.

The symptoms of diverticulitis of the cecum are variable, perplexing and puzzling. They conform in general to the symptoms of 1, inflam-

matory trouble or tumor; 2, vesico-colic fistula; 3, peritonitis; 4, pelvic syndromes; 5, intestinal obstruction; 6, mimicry of carcinoma.

Pain of varying degree in the lower abdomen is the most constant symptom. Usually there is a history of several attacks over many years and the inflammatory trouble is more or less acute. Tenderness and rigidity are usually present and a tumor is felt in about 30% of the cases. There may be abscess formation with fever and leucocytosis, and a history of alternate constipation and diarrhoea which is very suggestive. There is usually an absence of blood in the stools as the mucosa is seldom involved. Bladder symptoms and pelvic symptoms may also be present.

The age of the patient is usually between 45 and 70, the average in one series was 54. It is more than twice as common in men as in women and the subject is usually much overweight. Fever is usually present during an attack and white counts are recorded varying from 13,000 to 30,000.

Also, increasing frequency of micturition, mucus in the stools, acute colic, pain in the lower abdomen, with constipation and tenesmus, and slight rise in temperature are recorded as symptoms.

Just as appendicitis may occur with left-sided localization or symptoms, so with greater relative frequency diverticulitis of the sigmoid may occur with right-sided symptoms due to relative mobility of the sigmoid loop. In such a case it would require x-ray examination to differentiate between sigmoid and cecum.

In a reported series³ of twenty-seven cases of diverticulitis of the colon there was an average loss of weight of ten pounds, and all of the patients were very well nourished. Pain was a constant symptom except in one case in which there seemed to be some doubt. The pain was usually in the lower abdomen, but occasionally about the navel, and had been present off and on for more than a year. Tenderness was present in only two of these cases.

The usefulness of the x-ray is restricted by the fact that a diverticulum which is causing symptoms usually contains solid feces, which would tend to prevent barium from entering the diverticulum to an extent adequate to reveal its outline.

In one reported series² of one thousand x-rays of the intestinal tract diverticula were noted in six cases. Of these six cases all were men, their ages varying from 53 to 71. In four cases there was no evidence of delay in the bowel, and the diverticulum-bearing area of the bowel was freely movable.

In the diagnosis of abdominal pain the cause of which is doubtful, the possibility of diverticulitis should be considered and especially so in cases of inflammatory trouble, tumor

formation, vesico-colic fistulae, peritonitis, pelvic syndromes and intestinal obstruction.

It is relatively more frequent in men. The patient is usually in the second half of life, well nourished and lacks the "shades of malignancy." The history is usually one of long standing with intermittent attacks of diarrhoea and constipation, slight nausea, and pain below the umbilicus varying in degree, usually associated with moderate fever. There is often a history of tumor formation with subsequent disappearance. And there is usually an absence of visible blood in the stools.

There may be present a vesical fistula in which malignancy may be excluded by cystoscopy. X-ray demonstrations may in some cases prove the diagnosis.

Diverticulitis must be differentiated from carcinoma, which at times cannot be done until it is in the hands of the pathologist. It simulates hyperplastic tuberculosis, actinomycosis, pelvic inflammation in general and syphilis.

The treatment of diverticulitis of the large bowel is essentially the same in all of its parts. The condition is usually surgical and removal of the diverticulum-bearing area should be accomplished when possible in view of its potentiality for mischief. The perforated cases with abscess formation usually recover when adequate drainage is established. Recurrence may take place but it is not unlikely that the diverticula were overlooked at the first operation.

No case of supposed cancer of the cecum or large bowel should be regarded as inoperable either before or at laparotomy unless diverticulitis has been remembered, fully considered and systematically investigated.

Report of three cases follows:

CASE 1.—Mrs. R. N. B., age 58, born in Massachusetts. Truesdale Hospital, No. 2419, Sept. 13 to Oct. 11, 1915. F. H. and P. H. unimportant. P. I.: Indigestion off and on for nine years, lasting for several weeks at a time, consisting of nausea, no vomiting, right-sided abdominal distress. During the two years previous to entering the hospital she had had four sharp attacks of abdominal pain with slight fever. During the two previous months she had felt a constant increasing discomfort in the right abdomen. There had been some loss in weight but the amount was not known. P. E.: Not remarkable except for the abdomen, in which a hard, non-tender mass with a smooth surface, about the size of a grapefruit, was found on the right, opposite the umbilicus and not movable. *Pre-operative diagnosis:* Malignant disease of ascending colon.

Operation: Showed that the mass involved the cecum and first part of the ascending colon. It was extremely hard and extended into the mesentery. It was nodular on the sides and the peritoneum, which covered it, was about one-half inch thick. The ilium was obstructed at its entrance into the cecum. An attempt at removal was out of the question owing to the patient's condition. An anastomosis was made between the lower ilium and the ascending colon. Two drains were placed in a pocket from which pus escaped and the wound closed to the drains. Her convalescence was uneventful except for a consid-

erible amount of foul, purulent discharge about the drains during the first 10 days after operation.

Remarks: The mass was considered probably malignant at the time of operation. But in view of the fact that she is alive and well now, eight years after operation, and that the mass has disappeared, it would seem probable that it was a case of diverticulitis of the cecum with abscess formation.

CASE 2.—Miss E. L. C., age 29, born in Canada. Truesdale Hospital, No. 2814, May 31, to June 24, 1916. *F. H.* and *P. H.* unimportant. *P. I.*: Three years ago suffered from attacks of nausea with loss of weight, but no pain and no vomiting. During the past year this history has been repeated off and on for several weeks at a time. *P. E.*: Entirely negative except for slight tenderness in the right lower quadrant of the abdomen. *Pre-operative diagnosis:* Chronic appendicitis.

Operation: The appendix was normal as were all of the abdominal organs except the cecum, which presented a single diverticulum, about three-fourths of an inch in diameter, filled with a hard fecalith.

After dislodging the fecalith into the bowel the diverticulum was inverted and sutured. The appendix was removed incidentally. Her convalescence was uneventful.

Remarks: She has remained well seven years after operation.

CASE 3.—Mrs. M. F. T., age 62, born in Massachusetts. Truesdale Hospital, No. 4538, June 6 to July 18, 1919. *F. H.* and *P. H.* unimportant. *P. H.*: Pain in the abdomen only since yesterday, which has increased in severity, particularly on the right side, though not definitely localized. She has vomited several times. *P. E.*: Abdomen tender throughout the right side, rather more so in the lower quadrant, where there is slight spasm. Temperature 100. *Pre-operative diagnosis:* Acute appendicitis.

Operation: Appendix normal. There was an enlargement, about the size of a hen's egg, appearing to be a growth involving the cecum, closely adherent to the mesentery. As it appeared probable that this growth was malignant a resection was done and a side to side anastomosis made from the illua to the colon. Except for a superficial infection at one end of the wound her convalescence was uneventful. *Post-operative diagnosis:* Diverticulitis of cecum and ascending colon.

Remarks: Examination of the portion of bowel resected disclosed a diverticulum surrounded by a dense mass of scar tissue and containing a fecalith the size of a grape. She has had no illness since leaving the hospital and reports her condition as "excellent."

SUMMARY

Diverticulitis of the cecum, though rare, commands interest because of the difficulty of its differentiation from carcinoma, tuberculous or appendiceal abscess.

Intervention and the extent of the operation depends upon the appearance of the tumor when it is inspected and palpated with the abdomen open.

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DROP WRIST—TRAUMATIC AND BILATERAL.*

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As every student of medicine once knew, the brachial plexus is formed by the union of the anterior primary divisions of the fifth, sixth, seventh, and eighth cervical nerves and the greater portion of the first thoracic nerve, also receiving fasciculi from the fourth cervical and the second thoracic. It extends from the inferior side of the neck to the axilla, is narrow opposite the clavicle, becomes broad and forms a more dense interlacement in the axilla, and divides opposite the coracoid process into numerous branches for the supply of the upper limb.

The branches of the brachial plexus are arranged in two groups, viz., supraclavicular and infraclavicular. Our immediate interest is confined to certain of the infraclavicular branches, those supplying the forearm and hand, viz., musculocutaneous, internal cutaneous, median, ulnar, and musculospiral.

The musculocutaneous nerve arises from the outer cord of the brachial plexus, opposite the lower border of the pectoralis minor muscle. It supplies the coracobrachialis, the biceps, and the greater portion of the brachialis anticus muscle, and conveys sensory fibers to the integument on the outer half of the flexor surface of the forearm.

The internal cutaneous nerve arises from the inner cord of the brachial plexus in common with the ulnar nerve and the internal head of the median nerve. It supplies the integument on the anterior and posterior surfaces of the ulnar side of the forearm as far as the wrist.

The median nerve extends centrally along the arm and forearm to the hand, lying between the ulnar and musculospiral nerves and between the ulnar and radial nerves. It arises by two roots, from outer and inner cords of the brachial plexus, respectively. It conveys sensory, motor, trophic, and vasomotor fibers to the forearm and hand. In its internal anatomy and physiology and in its reaction to disease, this nerve resembles quite closely the sciatic. It is concerned chiefly with pronation of the forearm, flexion

*Read before the Medical Society of the District of Columbia at Washington, D. C., on May 16, 1923.

of the wrist and fingers, and opposition of the thumb.

The ulnar nerve is situated along the inner side of the arm and is distributed to the muscles and integument of the forearm and hand. It innervates most of the intrinsic muscles of the hand and the integument of the hypothenar eminence, the little finger, and half of the ring finger.

The musculospiral nerve, the largest branch of the brachial plexus, of which it may be counted the continuation, arises from the posterior cord. It innervates principally the extensor muscles of the forearm, wrist, and fingers, that is, it supplies both the muscles and the integument of the posterior part of the arm, the forearm, and the hand. Its important branches are four in number, viz., muscular, cutaneous, radial, and posterior interosseous, the radial and the posterior interosseous being of chief interest in our study.

Drop wrist is usually defined as a paralysis of the extensor muscles of the forearm and hand, causing inability to dorsiflex the wrist or to extend the fingers. In some instances, the paralysis is not confined to the distribution of the musculospiral nerve, but all the intrinsic muscles of the hand supplied by the ulnar and median nerves may also be involved. Indeed, in the most extreme cases, all the infraclavicular branches of the brachial plexus supplying the forearm and hand are involved. In the majority of cases, however, the triceps and the supinator remain intact.

The musculospiral nerve is probably more often injured than any other nerve of the upper extremity, due largely to its exposed position. When paralyzed, the hand is flexed at the wrist and lies flaccid, with no power of extension. Supination is completely lost when the forearm is extended on the arm. The extent of sensory disturbance is very variable.

The most common cause of drop wrist is lead poisoning. Other causes are as follows: injury to brachial plexus at birth, hematoma within sterno-cleido-mastoid muscle, excessive pressure or traction upon the arms, separation fracture of clavicle during birth, cervical rib of sixth or seventh vertebra by injury to nerve roots or cords, application of the Esmarch bandage, the injection of sera, sudden violent contraction of the triceps muscle, acute poliomyelitis, multiple neuritis, occupation neuroses, crutch paralysis, fracture of neck of scapula, dislocation forward of head of humerus, etc. The most common accident followed by drop wrist is fracture of the humerus between the insertion of the deltoid muscle and the point at which the musculospiral nerve pierces the external intermuscular septum between the insertion of the brachialis anticus and the origin of the supinator longus muscle, that is, about $2\frac{1}{2}$ inches above the articular surface of the external condyle.

A lesion of the arm high involves the triceps, the brachialis anticus, and the supinator longus muscles, as well as the extensors of the wrist and fingers. In lesions just above the elbow, the arm muscles and the supinator longus are usually spared. The most characteristic features are the drop wrist and the inability to extend the first phalanges of the fingers and thumb. In the pressure palsies, the supinators are generally involved and the movements of supination cannot be accomplished. The sensations may be impaired, or there may be marked tingling, but the loss of sensation is rarely so pronounced as that of motion. Hamilton, in his study of fifty-five cases, reported the detection of sensory loss to be quite unsatisfactory and indefinite.

The affection is readily recognized, but it is sometimes difficult to say upon what it depends. The sleep and pressure palsies are, as a rule, unilateral and involve the supinator longus. The paralysis from lead is bilateral and the supinators are unaffected. Bilateral drop wrist is frequently seen in multiple neuritis, but the mode of onset and the involvement of the arms and legs make the diagnosis easy. The duration and course of the musculospiral paralyses are extremely variable. The pressure palsies may disappear in a few days. Recovery is the rule, even when the affection lasts for many weeks.

The most classical type of multiple neuritis is alcoholic neuritis, which is due to a poison of extrinsic origin. The onset is usually slow, being preceded by gastric catarrh and insomnia, with numbness and tingling of the extremities. Weakness, especially of the extensor muscles of the wrists and dorsal flexors of the feet; pain and muscular tenderness, the latter being most prominent in the muscles of the calf, where it is usually an early symptom, are soon manifested. As a rule, all nerves supplying the extremities ultimately become more or less affected, and in extreme cases cranial nerves may also suffer. The early loss of power in the extensor muscles soon causes double wrist and foot drop, and "steppage gait" is the result. It is rated as a calamity in some circles that the steppage gait is now rather rapidly passing out of style.

There are several well-established methods of specific treatment for drop wrist, as follows:

1. The cock-up splint, invented by Jones, should be put on immediately and kept on until the extensor muscles regain their power, as otherwise they might be overlengthened. This splint, not being long enough, should be supplemented in the early stages of the paralysis in order to prevent flexion of the fingers;

2. Nerve grafting is indicated when the nerve ends cannot possibly be brought together. Autogenous grafting seems to be the only safe procedure, as it is rarely practicable to provide a

graft from an amputated limb of another person, and heterogenous grafts from animals do not give good results;

3. Tendon transplantation seems to be definitely indicated: (a) in severance with large loss of substance of the musculospiral nerve, (b) in severance of the musculospiral nerve with much bone injury and prolonged suppuration, (c) in cases where very rapid and complete wasting of the extensor muscles has supervened, and (d) in all cases of division of the posterior interosseous nerve;

4. Arthrodesis is sometimes employed in drop wrist following anterior poliomyelitis, according to Albee's method. The graft is obtained from the tibia, inserted in the radius above, and allowed to rest on the dorsum of the os magnum below. This graft is intended to support the paralytic wrist in extension and to restore the grasp of the flexion of the fingers;

5. The destruction of adhesions, whether recent or old, about the involved nerve brings most gratifying results in many cases. To prevent the recurrence of adhesions, the nerve is transplanted into a new bed and covered well and loosely with fascia;

6. Some general measures are massage, electricity, warmth, whirlpool and warm paraffin wax baths, ionization, hydrotherapy, radiotherapy, physiotherapy, diathermy, reëducation, etc.

Flecker advocates a splint moulded to the dorsal surface of the forearm and of the hand, reaching only as far as the metacarpophalangeal joints, and with a hinge opposite the wrist. The thumb may be left entirely free, and the lower part of the splint strapped across the hand. A tension spring, stretched from the upper end of the forearm piece to the lower end of the hand piece, should be sufficiently strong to maintain extension and to prevent absolutely all flexion at the wrist. This splint permits some movement at all joints, corrects the drop wrist fully, does not allow flexion of the wrist, and makes possible to the patient the use of his thumb and fingers.

In 1915, Murphy published his method of tendon transplantation. He used the flexor carpi radialis muscle alone, inserting it into all the three extensors of the thumb and then into the index and common extensor. The tendon was sutured in a V-shaped manner and was supposed to cause extension of all fingers, depending on the degree of contraction of muscle.

In 1916, Speed described his tendon transplantation for the temporary relief of drop wrist, pending the arrival of the time when nerve suture could be safely attempted. This consisted of transplantation of one-half each of the flexor carpi radialis and ulnaris tendons, respectively, into the base of the second and fifth metacarpal bones, while the hand was held in hyperextension. Speed's later operation for

permanent relief is briefly as follows: the flexor carpi ulnaris is transplanted into the several tendons of the extensor communis digitorum, especially into the extensor indicis and also the extensor longus pollicis; the flexor carpi radialis is transplanted into the extensor brevis pollicis and the abductor longus pollicis; the supinator longus is severed from its radial insertion, and its free end is transplanted into the belly of the common extensor while the hand is held in full extension.

Venable reported two interesting cases in 1915, a boy 11 years old and a man 43 years old. The boy had fallen at five and fractured the lower end of his right humerus; an exostosis which developed near the biceps tendon and inhibited flexion, was removed at 10; nine days after the operation, drop wrist was noticed. The man underwent an operation for osteomyelitis of the left humerus, the bone being entered about the middle third along the border of the brachialis anticus; four days later drop wrist was observed. These patients were given massage, electricity, etc., for eight and nine months, respectively, with their condition growing steadily worse, pronounced muscular atrophy and the reaction of degeneration being present. Whereupon, the musculospiral nerve was transplanted into a new bed and covered well with fascia from the brachialis anticus. A palmar splint was applied to relieve tension on the extensors, and general measures of treatment were followed. The boy recovered completely in three months, and the man in four.

Yohannan reported in 1921 the case of a man 22 years old, whose arm "gave way" while throwing a baseball, the right humerus being fractured $2\frac{1}{2}$ inches above the elbow. The fracture was reduced, and the arm was put into a plaster cast. X-ray facilities were not at hand. Three weeks later the cast was removed, the arm was stiff, extension was painful, there was numbness of the thumb and index finger, motion of the wrist was limited. The patient was removed to a hospital, where the roentgenogram revealed an oblique fracture of the middle shaft of the humerus with overriding and poor position. At operation, the musculospiral nerve, instead of being in its smooth groove, was found to be riding on a hard ridge and surrounded by a mass of callus. The fracture was duly corrected, the exostosis was chiseled off, and the musculospiral nerve was transplanted over a piece of triceps muscle. Complete recovery resulted in a short time.

Lewin reported in 1922 a case of ulnar palsy in a woman 26 years old, due to pressure from a plaster-of-Paris body jacket, which she was wearing for osteoarthritis of the upper lumbar spine. This cast had been on for eight weeks, and the patient was accustomed to sleeping with arms over head. While sleeping thus, the edge of the

cast pressed hard against the right arm, causing typical ulnar pressure palsy. The prehensile sign of Froment, that is, inability to grasp a sheet of paper with tips of thumb and index finger, and all the usual signs and symptoms of the condition were present. The cast was trimmed under the axilla, and the patient was treated by massage, active and passive movements, and reëducation. At the end of two months she was again normal.

Wholey reported in 1922 a case of musculospiral palsy due to excessive golf-playing in a man 35 years of age. He first complained of severe pain to the left of the spine over the lower part of the neck, which came on after retiring at night and disturbed his sleep. Examination revealed some involvement of the entire musculature supplied by the musculospiral nerve, such as pronounced weakness of all extensor muscles of the left arm, numbness over the radial surface of the thumb, exaggeration of all the deep reflexes of the extremity, tenderness on pressure over the nerve trunks, etc. The patient had occasionally noticed slight symptoms of pain in the left thumb and shoulder and slight weakness of the left arm for about one month. He was constitutionally hyperactive, more or less exhausted nervously all the while without being aware of the fact, crowding his daily golf in despite his long and arduous business hours. When this man finally took a general rest, the symptoms disappeared after several weeks and he was able to resume golf without any difficulty. The numbness over the thumb and forearm remained to some extent for two months after the onset.

The special object of my appearance here this evening is to present the case of W. J. L., who came under my observation on December 5, 1921, when less than seven years old, suffering from bilateral drop wrist of traumatic origin. This boy, always mischievous and hard to control, verily possessed of the devil, had been severely punished three days previously by his "fond" mother, half negro and half American Indian. She had seen fit to bind him with a small rope about his chest, tying the arms two inches above the elbows securely behind his back, and to suspend him bodily from the ceiling in the furnace room for approximately forty minutes. It seems that the boy struggled rather constantly during this period but was entirely unable to extricate himself. When he was finally "cut down," his "executioner" found him absolutely helpless so far as his hands were concerned.

Upon examination, I found the patient suffering from intense inflammation of both arms, the most involved areas being about two inches above the elbow, and from total loss of use of both hands. There were annular contusions of the second degree on the arms, showing where

the rope had been applied, except that the contusion on the palmar surface of the right arm was of the third degree. It was determined that the musculocutaneous, the internal cutaneous, the median, the ulnar, and the musculospiral nerves of the right arm had been severely injured, resulting in paralysis both motor and sensory, and that the same lesion, with the exception of slighter involvement of the median nerve, existed in the left arm. He still had a faint degree of flexion of the terminal phalanges of the index and middle fingers of the left hand, and there was practically no impairment of sensation on either palmar or dorsal surface of these same fingers. With these exceptions, no kind of stimulation seemed to yield any response, his hands lay perfectly flaccid and appeared absolutely lifeless.

Following my advice, the patient was admitted to the Children's Hospital on December 6, 1921, where he remained until January 24, 1922. His forearms and hands were promptly placed at physiological rest by means of cock-up splints made of plaster of Paris, extending from near the elbow to the second phalangeal joint, and were held thus for three weeks. Then the casts were split and were removed for increasing periods each day of the next two weeks, in order that massage and passive movements might be carried on. He was encouraged to move his fingers and to use his hands from the very earliest moment possible. During the last two weeks in the hospital, the cast splints were left off altogether, and the patient showed steady improvement under massage, thermotherapy, and reëducation. The left extremity began its return to normalcy and became normal several days in advance of the right, the musculocutaneous evidently being the first and the ulnar being the last nerve to recover.

Upon discharge from the hospital, he was able to extend both hands readily and to "make a fist" fairly well with the left hand. His mother was advised to have him use his hands at home in interesting work or games and to carry on the hospital treatment as carefully as possible. I saw him about once every three weeks during the next three months, and he gave distinct evidence on each occasion of progress toward complete recovery. My observation of the case ended on May 2, exactly five months after the onset of the trouble, when he was discharged as normal.

I saw the patient again on May 11, 1923, and found him to have no sequela of his affection whatever except a large scar on the palmar surface of the right arm. He is still able to recite the details of his unique "air voyage" in a graphic manner. His body is sound, apparently, but who knows what the American Indian in his nature may yet bring forth as the fruits of sweet revenge?

DETERMINATION OF STANDARD (BASAL) METABOLISM OF PATIENTS BY A RECORDING APPARATUS.

BY PROFESSOR AUGUST KROGH, COPENHAGEN

[From the Laboratory of Zoöphysiology, University of Copenhagen.]

THE determination of basal or, as I prefer to call it, for reasons given in my book,¹ standard metabolism has come to be a regular procedure in clinical work for purposes of diagnosis and control of therapeutic measures, especially in all cases of thyroid disease.

In these and indeed in most clinical cases, except diabetes,* a knowledge of the respiratory quotient is unessential and it is necessary to determine only the energy output in terms of calories. As the caloric value of oxygen is approximately constant a simple determination of the oxygen intake will thus be sufficient to obtain an *approximate* determination of the standard metabolism.

The principle of measuring the oxygen intake by the decrease in volume of a small closed circuit respiration apparatus was introduced many years ago by Fredericq.² It has been independently developed for use in man by F. G. Benedict and his collaborators and at present quite a number of apparatus for the purpose of clinical metabolism determination are available.

Without in any way disparaging the value of these instruments, of which several, and notably the recording models of Benedict³ and Roth,⁴ are able to give perfectly satisfactory results, I venture to believe that there is still room for some improvement in technique by which the accuracy of the measurement and the ease and safety of manipulation can be increased. The improvements which I wish to suggest concern both the apparatus, the technical procedure of the determination itself and the preparation of the patient for the determination.

My apparatus which has been developed independently of all the American types from a recording respiration apparatus described in 1913⁵ is simplified by the use of a special kymograph, firmly connected with the recording spirometer and made to revolve by clockwork at a suitable and constant rate so that a special time recording device becomes superfluous. For CO₂ absorption a specially prepared soda lime is employed of which one charge will absorb about 800 liters carbon dioxide sufficient for a very large number of determinations.

*Dr. H. C. Hagedorn has utilized the recording respiration apparatus described below in combination with a very ingenious test principle to construct an apparatus which will give at the same time graphic records of the CO₂ output as well as the oxygen intake of a patient. This instrument, which will be invaluable in all such cases where a knowledge of the respiratory quotient is of fundamental importance, will become available in the near future.

The main part of the apparatus, which is shown diagrammatically in Fig. 1 is a recording spirometer with an aluminium bell of the rocking type described by Krogh and Lind-

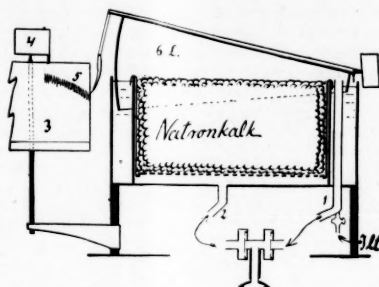


FIG. 1.

hard.⁶ An absorbing vessel for CO₂ (Natronkalk in the figure) is built into the spirometer itself. It contains 8 kg. of specially prepared moist soda lime sufficient for several hundred determinations. The spirometer is connected through rubber tubing and respiration valves with a mouthpiece or mask for the patient. When the patient inspires, air is drawn from the spirometer bell through the tube 1, while the expired air returns through the tube 2 and the CO₂ absorber. The kymograph drum (3) is revolved at a constant rate of 20 mm. per minute by the clockwork (4) and the respirations are quantitatively recorded in ink on the kymograph paper. Since the system formed by the lungs and respiratory passages of the patient, the pipes, and the spirometer is completely closed, the oxygen intake causes a steady falling off of the respiration curve (5). On condition that the temperature of the apparatus remains constant, that the velocity of the kymograph paper is regular, that the patient maintains a constant expiratory volume of the lungs and finally that the oxygen intake remains constant it will be possible to draw a straight line connecting all the points of expiration on the curve, and the tangent to the angle of this line will be proportional to the oxygen intake.

The first of these conditions is as a rule easily fulfilled when the temperature of the room is fairly uniform, and the second depends only on the clockwork. The third condition is fulfilled very closely by persons having a uniform respiration as in the curve Fig. 2, but experience has shown that even in cases where the respiration is extremely irregular as in Fig. 3, it is almost always possible to draw one, and only one, line representing the normal expiratory position of the chest of the patient. This is due to the fact that this position is one of equi-

librium between the elastic forces of the chest and the lungs and is taken up automatically, when all the respiratory muscles are at rest. The fourth condition, the constancy of the oxygen intake, is therefore controlled by the apparatus itself, and deviations can be recognized by the line connecting the points of expiration not being absolutely straight but more or less regularly curved.

The oxygen intake can remain constant only when the percentage of oxygen in the inspired air does not sink below a certain level. At the

curved or irregular, there has been either a temperature variation, which is easily controlled, or the metabolic activity of the patient has varied. The simplest way to be sure that the patient is in a state of mental and muscular relaxation is to count the pulse, which should be done repeatedly before and during the determination. In doubtful cases the patient should remain lying quietly after the determination, and a few more countings taken. As the body temperature is one of the main factors determining metabolism, it should be regularly

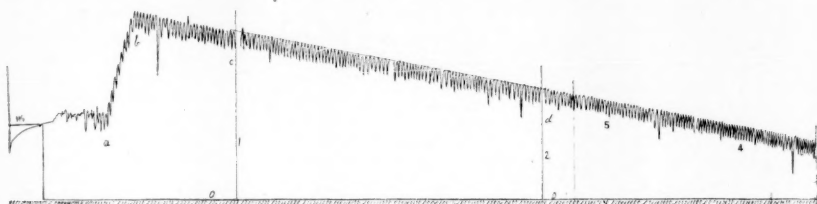


FIG. 2.

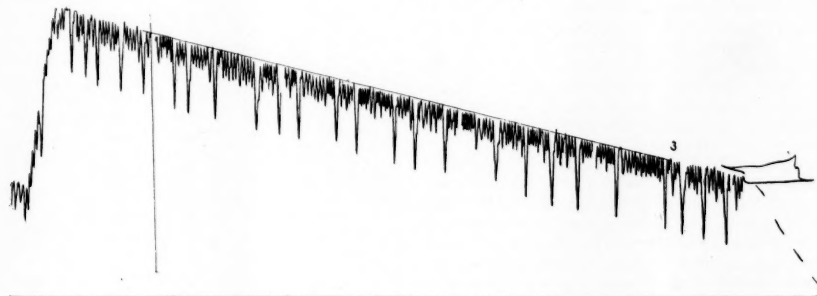


FIG. 3.

beginning of an experiment 4 - 5 l. oxygen are therefore added from a cylinder through a small tap (It) on the inspiration pipe. This will raise the oxygen percentage in the whole system from the normal 20 per cent. to about 40 per cent. and during the first few minutes there will be an increased oxygen absorption and a compensatory liberation from the blood and tissues of nitrogen. As the compensation is probably incomplete, and since there is at the same time a slight increase in the temperature of the apparatus, the respiration curve obtained during the first 5 minutes cannot be regarded as normal and should be discarded.

After the first few minutes the blood is practically in equilibrium with the altered composition of the inspired air, and the oxygen intake will remain unaffected, as numerous experiments have shown by the slight increase in oxygen percentage in the air of the lungs.

If the line representing the oxygen intake is

controlled. All cases of fever must of course be excluded, but small variations can be corrected by allowing 1 p.c. for 0.2°C. or 3 p.c. for 1°F.

Fig. 2 shows a respiration curve obtained by means of the recording apparatus. The part *a-b* shows the addition of oxygen to the apparatus; *b-c* represents the oxygen intake during the next few minutes when it is not absolutely constant. The part *c-d* is accurately represented by the straight line which has been drawn by rule afterwards. The line *o-o* is a zero line, obtained by revolving the drum with the spirometer bell in its lowest position. During the experiment the kymograph paper moves at a constant rate of 20 mm. per minute, corresponding to 1 revolution in 30 minutes. The spirometer is very carefully calibrated, and a special measuring scale provided. When this scale is put on along the lines 1 and 2, which are 200 mm. (10 minutes) apart, the position of

the bell can be read off directly in liters to 2 decimals, and the difference gives the oxygen intake during the 10-minute period.

The volume of oxygen absorbed according to the readings is measured at the temperature of the spirometer, the barometric pressure prevailing at the time of the experiment and, as special experiments have shown, practically saturated with moisture. It must of course be reduced to normal conditions (0° Centigrade and 760 mm. dry pressure) by means of a table accompanying the apparatus.

A comparison has been made by M. Krogh and O. Rasmussen⁷ between the gas exchange recorded by means of the apparatus now described and that obtained by measuring and analyzing the expired air over a suitable period. The accuracy of these two methods appears to be the same, though the recording apparatus shows a tendency to give slightly lower results (1.2 per cent.).

It is well known that the resting metabolism of a human subject as observed over a short period of 5 to 10 minutes depends not only upon the obvious condition that absolute rest and relaxation of the muscle system are maintained during the experiment, but also on the rate of muscular activity and absorption of food in preceding periods. This difficulty is usually met by prescribing that determinations shall be made in the morning immediately after the night's rest in bed and before the subject has taken any food. These conditions are certainly necessary but, according to the experience gained in my laboratory and elsewhere, not quite sufficient.

We find that the metabolism in the postabsorptive state and after the night's rest may be very definitely influenced by the food and the muscular activity of the preceding day. If the food has contained much protein, we find a distinctly higher metabolic level than when protein makes up a small fraction only of the total intake. Any unusual amount of muscular exercise taken on the day before the experiment will also produce a definite increase in metabolic rate.⁸ We insist, therefore, that the subject shall, on the day before the determination, take food which is poor in protein, and that he must abstain from any unusual muscular exertions.

Even on a low protein diet, the composition of the food of the preceding day shows a distinct influence upon the respiratory and energy exchange. It is well known that the energy value of oxygen is not quite constant, but varies with the material catabolized from 4.7 cal. per l. oxygen, when the respiratory quotient is 0.71 to 5.05 cal., when the respiratory quotient is 1.00, a variation of about 7 per cent. Apart from this, Krogh and Lindhard⁹ have found that the heat-production itself depends, to a certain extent, upon the mixture of fat and car-

bohydrate catabolized, showing a minimum at quotients between 0.8 and 0.9, increasing about 5 per cent. when the quotient falls to 0.71 and 3 per cent. when the quotient rises to 1.00 as seen in the adjoined curve.

When the metabolism is determined by measuring and analyzing the expired air over a certain period the respiratory quotient is determined directly, and the change in energy value of the oxygen is allowed for. It has not become customary to allow also for the variation in heat production depending upon the quotient, but in my opinion this ought to be done in all determinations where a high degree of precision is aimed at by reducing the metabolism observed at any quotient to the value at a quotient of 0.85.

All gas-exchange determinations of short duration made on subjects who are not thoroughly familiar with the technique, and especially all such determinations made by means of masks or mouthpieces, suffer from the drawback that the quotients as directly determined are extremely likely to differ from the true respiratory quotients of the metabolic processes going on.

The body contains a large store of dissolved and loosely combined CO₂, part of which is readily given off by overventilation. This point has been studied quantitatively by Liljestrand,¹⁰ who found that overventilation resulting in a decrease of the CO₂ tension of the blood of 1 per cent. would cause about 0.9 liter of preformed CO₂ to be washed out into the expired air, raising the observed respiratory quotient for a certain period considerably above unity. In inexperienced subjects overventilation very often occurs at the beginning of an experiment or in the introductory period and any overventilation, however slight, will give rise to an increase in the respiratory quotient which is purely artificial and has nothing to do with the metabolic processes.

When the breathing appliance is a permanent source of inconvenience, the washing out of CO₂ will often last throughout the experimental period, but when the subject feels comfortable, the respiration usually soon becomes normal or even subnormal, in which latter case less CO₂ is expired than is produced by the metabolic processes and we have again an artificial decrease in the respiratory quotient.

These facts are well known, but they are scarcely sufficiently appreciated as serious sources of error in determinations of the respiratory exchange by means of experiments of short duration.

Krogh and Lindhard⁹ have made extended series of observations on trained subjects on whom fairly reliable determinations of the true respiratory quotient could be obtained in 5-minute experiments. The diet of these subjects was always poor in protein, but was varied

at frequent intervals from consisting almost exclusively of fats, through a mixed diet to an almost exclusive carbohydrate diet. These experiments showed that the respiratory quotient found in the morning before breakfast could be predicted fairly accurately from the diet of the preceding day, and we utilize this result in all our determinations of basal metabolism of patients made with the recording apparatus.

We prescribe for the day preceding a metabolism determination a diet of low protein and consisting chiefly of carbohydrate with enough fats to make it palatable.

As shown in control experiments by M. Krogh and O. Rasmussen⁷ such a diet will give the next morning a metabolic respiratory quotient between 0.9 and 0.8 corresponding, as mentioned above, to the lowest possible metabolic level and further to a definite caloric value of the oxygen intake which can be taken as 4.9 calories per liter oxygen with an error which will rarely exceed 1 per cent.*

When a reliable estimate of the "basal" metabolic level of a patient is desired, a single determination, or even two or more determinations made on the same day, should not be considered sufficient, because the patient may for some accidental reason or other show an *increased* metabolic rate, but at least two determinations should be made on separate days. If these agree, the result may be accepted with some confidence, but if they differ, more determinations should be made and the *lowest* results which agree within the experimental error should be accepted as final.

Having obtained a reliable value for the standard metabolism of a patient we have to face the difficult problem of comparing it with the normal. The splendid researches of a number of investigators, and especially of Benedict and his co-workers at the Nutrition Laboratory, have shown conclusively that the standard metabolism of a normal person is not simply proportional to his weight or to his "surface," but depends on a sum of factors, among which the sex, age, weight and height have been recognized as being of paramount importance. There are at present at the disposal of clinicians two different systems for computing or "predicting" the normal standard metabolism of persons on the basis of these 4 factors, the Du Bois "surface" chart¹¹ and simple table¹² and the elaborate Harris-Benedict prediction tables.¹³ Each of these systems has certain advantages, and the choice is, therefore, exceedingly difficult.

According to Boothby and Sandiford¹⁴ the metabolism calculated for the same persons by

the methods of Du Bois and H.-B., respectively, shows on the whole a satisfactory agreement, but the metabolic rates calculated from the H.-B. tables are on an average about 4 per cent. lower than those found by the Du Bois formula. The difference appears to be slightly larger (4.5 per cent.) for men than for women (3.9 per cent.), but this may be accidental. When the rules of procedure given above are followed closely, the lowest possible values will be obtained for the metabolism, and determinations made on normal subjects will probably agree more closely with the H.-B. than with the Du Bois predictions. This holds good only with certain reservations, however.

The H.-B. prediction-tables are calculated from two formulas worked out by statistical methods from the entire material of determinations. The formulas run:

$$\text{For males } h = 66.4730 + 13.7516w + 5.0033s - 6.7550a$$

$$\text{For females } h = 655.0955 + 9.5634w + 1.8496s - 4.6756a$$

where h = "basal" heat production for 24 hours, w = weight in kilos, s = height in cm., and a = age in years.

It is evident that these formulas are purely statistical and can have nothing to do with the biological laws which must be supposed to govern the relations between the metabolism and sex, weight, height, and age, respectively. In biological formulas we could not have a fundamental constant of 66 for men and about 10 times as high (655) for women, and we could not have the influence of height about 3 times as large for men as for women. Above all we could not have the weight, height, and age, of a subject represented as having simply additive influence upon the metabolism and we could not, as pointed out by Boothby and Sandiford, accept the influence of age to be a simple straight-line function of the age, and totally independent of the size of the subject.

The fact that these formulas are of a statistical nature and represent the influence of each factor simply as proportional to the numerical value of that factor implies that the predictions based on them must be very reliable for subjects who have weights, heights, and ages in the neighborhood of the average weight, height, and age for the total number of individuals upon whom the determinations have been made, but will be increasingly unreliable the more the subjects differ from that average.

The Du Bois method of calculating the normal metabolism of a subject from the sex, age, weight and height, is based on an estimation of the surface area and assumes that for a given sex and age the metabolism is proportional to this area. While it must be admitted that the metabolism has probably nothing whatever to do with conditions governing loss of heat or

*According to an oral communication by Dr. Hagedorn the respiratory quotient of obese patients is often below 0.8 in the morning, even when the diet of the preceding day would correspond to a quotient of 0.9. In such patients care should be taken, therefore, to make the experimental diet very rich in carbohydrate and to make sure that they eat a sufficient quantity.

with the outer surface of the body as such, the researches, especially of Dreyer and his collaborators, point very clearly to the existence of a definite proportionality between the bodily functions and the n^{th} power of the weight (w^n) where n is approximately $2/3$ and represents also the relationship between surface and weight. However this may be, Boothby and Sandiford¹⁵ have shown that for persons of normal build the formulas of H.-B. can be transformed into formulas for calculating "surfaces" which will agree very closely with those deducted from Du Bois height-weight chart. The two methods, therefore, show a practical agreement regarding the factors for weight and height.

The age-factor is introduced by Du Bois by means of a small table giving the calories per sq. meter for the age intervals 14-16, 16-18, 18-20, 20-40, 40-50, 50-60, 60-70, and 70-80 years, according to experiments on groups of subjects. It would certainly be preferable to use a smoothed curve, from which the age-factor could be read off, but it must be admitted that the Du Bois way of introducing the age factor is in much better agreement with biological principles than the Harris-Benedict formula.

Boothby and Sandiford¹⁴ have published a series of determinations of standard metabolism on 102 normal subjects with their deviations from the Du Bois and the H.-B. standards respectively. I find by a calculation of these results:

$$\frac{M_o - M_{D.B.}}{M_{D.B.}} = 0.7 \pm 5.84\% \quad \text{and} \quad \frac{M_o - M_{H.-B.}}{M_{H.-B.}} = 4.8 \pm 6.06\%$$

meaning that the observed metabolisms (M_o) are on an average 0.7 per cent. higher than those calculated by the Du Bois method ($M_{D.B.}$) and 4.8 per cent. higher than the H.-B. standards ($M_{H.-B.}$) while the dispersion (standard deviation) of the results is respectively 5.8 and 6.1 per cent., a difference which is certainly insignificant. A large number of these subjects had only one metabolic rate determination which will certainly on an average give a result which is too high on account of the "nervousness" of the subjects, and it is no cause for surprise, therefore, that the average results are higher than those calculated on either basis.

SUMMARY.

A closed circuit respiration apparatus of very simple design is described which will give a graphic record of the respiration and the oxygen intake of patients and provide an automatic control that the metabolism remains uniform.*

The muscular activity and the diet of pa-

*This apparatus can be obtained in North America from H. N. Elmer, 1641 Monadnock Block, Chicago, Ill.

tients on the day preceding a metabolism determination should be controlled. The diet should be poor in proteins and have a high proportion of carbohydrates. When these conditions are fulfilled the metabolism will attain the lowest level and the caloric value of the oxygen will be constant at 4.9 cal. per liter.

A single determination on a patient is not sufficient to establish the "basal" metabolism, and if possible more determinations should be made on separate days.

The Harris-Benedict prediction-tables for the "basal" metabolism are very reliable for average subjects but, owing to their statistical nature, less so for persons of exceptional build or higher age. The Du Bois method and table for computing the basal metabolism give results which are on an average too high (about 4 per cent. or more) but they are less likely to fail when used on exceptional subjects.

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WHO SHOULD BE "PAY CLINIC PATIENTS"?

STUDY OF PATIENTS TREATED AT THE CORNELL CLINIC, NEW YORK CITY.

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BOTH in medical circles and among the general public wide interest was manifested in the pay clinic established by Cornell University Medical College in November, 1921, as an effort to provide adequate medical service for per-

sons of moderate means who could not afford to pay the usual private rates for the care required.

It seemed, therefore, desirable to the Committee on Dispensary Development of the United Hospital Fund, which had cooperated with Cornell in initiating this experiment to institute studies as to the social and economic groups reached by the clinic, so as to ascertain as far as possible the elements of the population whose needs this type of clinic appeared actually to meet.

The following study of nearly one thousand records of patients admitted to the clinic was therefore made as one of several methods of investigating the problem. Miss Elizabeth C. Tandy of the staff of the Committee on Dispensary Development had charge of the work, under the supervision of the writers, and the tabulations were performed, under Miss Tandy's supervision, by a group of students in the Statistical Laboratory at the University.

In order to secure approximately one thousand records which were sufficiently complete, it was necessary to go through about fourteen hundred consecutive case records, about four hundred of which had to be rejected, because some important item of information was not filled out with sufficient fullness. It is not believed, however, that there was any bias in such omissions, so that the 992 records on which the report is based are believed to be representative. The omission was generally due to the pressure upon the admitting force.

The following report is believed to be of interest, because it bears not only upon the Cornell Clinic alone, but suggests some of the factors which determine the ability of certain large classes of our population to meet the expense of medical service, and the study indicates ways in which this important problem can and should be further studied.

Of the 992 cases, 62 per cent. were employed, and of the remaining 38 per cent. not gainfully employed, about two-thirds were housewives, nearly all of the remainder being children. In other words, most Cornell patients are persons with family responsibilities. It is interesting that the large majority of the patients admitted to treatment state that they have had their complaint for a considerable period. Out of 723 who gave definite duration of their complaint, 29 per cent. had had it for more than three years; 22 per cent. for one year but less than three years, 8 per cent. for between six months and one year.

As indicated by these figures, and also by the diagnoses, most of the medical problems presented by the patients fall into two groups: (1) a chronic illness, often of obscure nature; (2) local conditions, chiefly defects and diseases of special organs, *e.g.*, eye, ear, throat, orthopedic, skin, etc. The proportion of cases of acute dis-

ease, such as would be treated by a general practitioner, is relatively small.

Nine hundred and fifteen of the 992 cases stated the previous medical care which they had received before coming to Cornell: Five hundred and forty of them, at some period before coming to Cornell, had been to a private doctor for their present complaint; some of these had had other care during the same period, as at a hospital or clinic, insurance doctor, etc. Forty had had attention from opticians, chiropodists, chiropractors, osteopaths, pharmacists, etc., previous to coming to Cornell. Three hundred and thirty-five had had no previous medical attention. It is found that few of those who have had care by a private doctor have come to Cornell unless they have had their trouble without relief for a considerable period. Thus, 70 per cent. of those coming to Cornell had had their complaint for more than six months, and were yet unrelieved.

The problem faced by the admission desk at Cornell Clinic is not the theoretical one of securing certain facts regarding the incomes, the size of family, etc., of a series of individuals. It is the very practical problem of reaching a decision as to whether or not an individual can reasonably be regarded as able to pay private medical rates for the service needed. In framing tentative standards for its admitting department in November, 1921, the Cornell Clinic prepared a statement from which the following quotations cover the essential points:

"In the acceptance of patients, decision must be based upon the relation of the patient's income, responsibilities or obligations to the cost of the needed diagnostic or therapeutic service. Knowledge of income alone or income in connection with size of family, is not sufficient to determine eligibility for admission, since the cost of diagnosis and treatment for different conditions varies within wide limits.

"Applicants for treatment will be divided into the following six groups on the basis of the judgment of the admitting officer. Each group will be designated by a letter and the record marked in a designated place with this letter.

"The groups are as follows:

"A. Patients believed to be regularly in the pay clinic group, as having an income which after consideration of the size and the responsibilities of the family to which they belong, would not enable them to pay the fees ordinarily charged in private offices for specialists' service, yet who have incomes sufficient to meet the rates charged at the pay clinic.

"It is estimated that a single person without family responsibilities, living in New York City, requires an expenditure of at least \$1100 per year for the necessities of life without any allowance for the care of health, and that the maintenance of a standard of living such as is demanded of teachers and some clerical positions requires an expenditure of \$1500 to \$1800, without any allowance for the care of health. Hence the income limits for Group A may be taken as \$1100 to \$1800.

"For a family of two the limits are \$1600 to \$2200; of three, \$1850 to \$2500; of four, \$2050 to \$2750; of five, \$2200 to \$3000.

"B. Patients believed to be temporarily in the pay

clinic group because of unemployment, previous illness, or other financial emergency. Patients of families with incomes higher than those named in Group A may thus fall into Group B.

"Group B and also the following group (C) are admitted for the current disease only. Later admission for a different condition will require reconsideration.

"C. Patients believed to be temporarily in the pay clinic group because of unusual expense of the diagnosis or care needed.

"D. Patients believed unable to pay the clinic fees, requiring reference to an ordinary dispensary. Patients, as a rule, with incomes below the minimum indicated under Group A will fall into Group D.

"E. Patients believed able to pay a private physician for the medical care which they require. Patients of families with incomes above the maximum named in Group A will, unless they are regarded as temporarily falling into Group B or Group C, be placed in Group E and referred to private physicians.

"The income limits above named and the estimates are subject to revision from time to time, following changes in costs of living and other conditions."

Obviously, making such classifications as are involved in these standards requires securing certain concrete facts from each patient, which may be classified under three heads:

(1) Resources of patient.

This involves the income of the patient or family and the extent to which the patient can draw upon the family income for his personal medical needs.

(2) Responsibilities.

The size of the family; number of wage-earners; number of dependents; special obligations or responsibilities, such as, to relatives, to creditors, etc.

(3) Cost of medical treatment for the required service. Since the cost of securing a diagnosis may vary from a few dollars to several hundred dollars at private rates for different diseases; and since the cost of treatment for various diseases during the period of a few months may likewise vary from an inconsiderable sum to a very large amount, it is essential to consider resources and responsibilities, with some reference to the nature of the trouble and the probable cost of its care. The question of ability to pay cannot be settled by resources and responsibilities alone, without reference to the cost of care.

It is not an easy matter to secure the necessary information from patients, particularly since the inquiry must be carried on at an admission desk, where time is precious, and where some decision must, as a rule, be reached without delay. Elements of inaccuracy are obvious, but it is not believed that bias on the part of the registrars exists, nor that patients generally do otherwise than state the truth as they know it.

Patients living alone and not members of families may be considered first in connection with data concerning ability to pay. Of the 169 individuals in this group, the average income was \$1279 per year; 20 per cent. of such individuals earn less than \$1000; 72 per cent. less than \$1500; and 99 per cent. less than \$2000.

Of the 823 patients who were living as mem-

bers of families, the sizes of families were as follows: 405, or practically half the whole group, were members of families of three or four persons (210 of three, and 195 of four). There were 200 families of two persons each, 180 of five or six, and 38 families of from 7 to 11 members. Among the 823 families, an important practical distinction is between those of one wage-earner and those with more than one. Five hundred and forty-six, or practically two-thirds of the group, had one wage-earner. The average income for the 546 families with one wage-earner was \$1720. With each subsidiary wage-earner there was an average increase in the family income of \$913. It is obvious that the additional wage-earners were chiefly young persons earning small amounts.

Among the 546 families with one wage-earner, the average income, as stated, was \$1720. About 50 per cent. fall within the group of \$1500 to \$2000. About one-third have family incomes of over \$2000, and 12 per cent., incomes over \$2500. The size of family generally increases with the increase in income. Of all the 823 families, there are 435 (over 52.9 per cent.) with incomes of more than \$2000, and 224 (27.2 per cent.) with incomes of over \$2500. Of these 435 families with over \$2000 income, 232 (54 per cent.) have two or more wage-earners, and 182 (42 per cent.) have three dependents or more in the family. Of the 224 families with over \$2500 income, 91 (41 per cent.) have three or more dependents in the family, and 161 (or nearly 80 per cent.) have two or more wage-earners.

In summary, the characteristic wage-earner of the Cornell group is the head of a family and has an income of about \$150 per month. If his family income is much larger than this amount, the family generally is of large size, so that the responsibilities are greater, or there is more than one wage-earner in the family. With each increase of one individual in the family, there is an average increase of \$344 in family income. This amount is remarkably even with every stage and size of family.

When we pass from these statistics to their bearing upon the practical questions of determining ability to pay, it is at once apparent that the problem is relatively simpler with the single individual than with family groups. With the latter the question often arises whether the total income of the family, derived from more than one wage-earner, can be considered as available for meeting the cost of medical service for one of its members. In many instances this is not the case, a subsidiary wage-earner being expected to meet his own charges for medical care, as well as make a more or less regular contribution to the family. Similarly, the chief wage-earner may not feel justified, except in case of great emergency, in calling upon subsid-

lary wage-earners for the care of health of himself or of his wife or their young children.

Families with more than one wage-earner are, in respect to ability to pay, not in the same condition as families with one wage-earner with an equivalent total of family income, as recorded in these tables. The degree to which this variation is significant requires further special study.

An item of major importance is the cost of medical care, fluctuating, as it does, within wide limits for the many different conditions presented at the clinic. This item is stated to have been considered by the registrars, but has not been made a matter of statistical estimate and tabulation. The diagnostic cost of gastro-intestinal conditions varies from \$25 to \$125 or \$150 in private practice. Moderate refraction fees run from \$5 to \$25 and glasses cost from \$10 to \$30. Obscure eye conditions frequently require an expenditure of more than \$100 prior to diagnosis. A case of primary or secondary syphilis may cost from \$5 to \$30 for diagnosis and require as much as \$350 additional expenditure for the first six months of treatment. Many families who ask admission at Cornell have already expended large sums for medical care. For instance, the chief wage-earner of a family of six recently requested admission for his daughter, who had been under the care of "specialists" for more than three years. The father had expended about \$3000, "as much as his salary," for the medical care of this child. Since the cause of the condition was still obscure he now asked her admission to the diagnostic clinic. Although no statistical analysis has yet been made of these varying costs, it is obvious that they must be considered by the clinic registrars.

It is evident that the great mass of these patients have such moderate incomes that they clearly fall within the limits set by the clinic, and the problem of judgment becomes a difficult one only in that 20 per cent. of cases in which the income of the individual or family is relatively high. It is in these instances that especial consideration is required of the size and the responsibilities of the family, of the cost of treatment, and of the extent to which the total family income—where there is more than one wage-earner—can be regarded as available for care of health.

As shown in our detailed tables, there is a regular and consistent correlation between income, size of family, and number of wage-earners, which tends to strengthen the belief in the general reliability of the figures and in the absence of bias in their collection. Further technical study needs to be made of the data which it is best to record as most indicative of the family's economic situation. It may be unnecessary to make record of all such items as the size of family, ages of members, number of

dependents, number of wage-earners, if one or two of these items, instead of all, are found sufficiently representative to save the labor of securing and setting down the others. In similar detail it is desirable to work out the best technique of questions in order to secure family income on an annual basis, allowing for seasonal and other fluctuations in various occupations. Above all, it is important to undertake the collection of data on cost of treatment of various conditions so that the registrars and the community in general shall be better able to estimate the significance of this fact in its application to particular cases.

An interesting comparison has been made between the income classes of these Cornell patients, with an estimate* of the incomes of inhabitants of New York City.

In the following table this comparison is shown for single individuals:

Income Class of Family.	Single Individuals, Cornell.		Estimated Single Individuals in New York City.	
	No.	%	No.	%
Less \$1200	76	45.0	300,000	23.5
\$1200-\$2000	91	53.8	500,000	39.2
\$2000-\$3000	2	1.2	300,000	23.5
\$3000-over			175,000	13.8
All classes	169	100.0	1,275,000	100.0

It at once appears that the large proportion (37 per cent.) of individuals earning incomes of \$2000 and over in the general population are practically absent from the Cornell Clinic. On the other hand, those earning the smaller incomes (under \$1200) appear in Cornell in much larger proportion than in the general population.

The next table shows a similar comparison for members of family groups. Here the families with the very small incomes (constituting 20 per cent. of the general population) are represented very slightly at Cornell, since they would turn, of necessity, to the ordinary clinic charging nominal fees rather than to a pay clinic. This necessarily makes the proportion of cases larger in the higher income groups.

Income Class of Family.	Clinic Patients Who Were Members of Families.		Estimated Members of Families in New York City.	
	No.	%	No.	%
Less \$1200	46	5.6	1,000,000	20.4
\$1200-\$2000	342	41.6	1,900,000	38.8
\$2000-\$3000	313	38.0	1,300,000	26.5
\$3000-over	122	14.8	700,000	14.3
All classes	823	100.0	4,900,000	100.0

In reviewing these data, the outstanding conclusion is that the facts tabulated, taken by themselves, are not sufficient in a certain number of instances to determine the question faced by the admitting department of the Cornell Clinic, namely, the question of the patient's ability to pay for medical service. The statis-

*Data furnished by Dr. Willford I. King to Miss Janet Thornton, of the staff of the Committee on Dispensary Development, have been the basis for these estimates.

tical data furnished by the records do not include in most instances anything regarding the cost of diagnosis or treatment. Consequently those cases in which the income, as related to size and constitution of family, leaves much margin above a minimum standard of comfort, cannot be placed in a scale of ability to pay, unless the amount that they are likely to be called upon to pay for a certain diagnosis or course of treatment can be at least roughly estimated.

It can hardly be too much emphasized that the question to be dealt with in connection with the admission of patients to a clinic such as Cornell is not that of income or responsibilities of families, but of *ability to pay* for medical service. The practical questions are two: (1) Upon what facts about an individual or a family does ability to pay depend? (2) What are the best methods of securing these facts most accurately and expeditiously, so that prompt and reliable judgments can be made? This question, however, is of much broader interest than the determination of the admissibility of patients for clinical treatment. The whole public as well as the medical profession has reason to be interested in the ability of persons of moderate means to pay for various types of medical service. The admission desk of such a clinic as Cornell is one of the places in which the problem of medical care for various economic and social groups of our population can be studied. Besides the practical importance of an admission system for a clinic which shall be courteous, prompt and effective in its medical and social distribution of patients, the larger public problems involved must not be lost to sight. Since the present article covers only a small part of the ground, further studies by the Committee on Dispensary Development are now under way. Adequate knowledge of the problem and satisfactory steps toward its solution require the coöperation of the physician, the social worker, and the statistician.

CONGRESS OF THE INTERNATIONAL SURGICAL SOCIETY IN LONDON.

The sixth Triennial Congress of the International Surgical Society, under the presidency of Sir William Macewen, F.R.S., of Glasgow, was formally opened on the morning of July 17 last by the Prince of Wales at the House of the Royal Society of Medicine, 1, Wimpole Street, London. There was present a large gathering of delegates, including women, representative of about sixteen nations. The delegates were welcomed on behalf of the British Government by the Marquis Curzon, Secretary for Foreign Affairs, and Mr. Neville Chamberlain, Minister of Health. This is the first time the Congress has been held in Great Britain. It may be

mentioned that it has been held in New York. The Prince of Wales made a short and appropriate opening speech, in the course of which he said that he was glad to extend the welcome to the foreign visitors, to the last President, Professor W. W. Keen of Philadelphia, who, in spite of the eighty-six years he carried so lightly, and the weight of a world-wide reputation, was again amongst us, ready as always to take part in every meeting, social as well as scientific. The Marquis Curzon said in part that he, as Foreign Secretary, wished to say in all sincerity that those international meetings, with whatever branch of science or art they might deal, were part of the great machinery for preserving the amity of the world. In the world of Science rivalry might exist, but hostility was unknown. There were no such things as nations, or groups of nations. No doubt, in the course of their movements the delegates would go down to the Houses of Parliament, where so many of them were engaged, quite ineffectively, in dealing with the maladies of the body politic of the world. He only wished they could apply one-tenth of the skill and one-hundredth part of the knowledge with which the members of the Congress dealt with the problems that came under their notice. Near to the Houses of Parliament was the place with which he was associated; it might be called the operating-room of the British Empire. He spoke of the Foreign Office. There he was engaged at the present time in applying the scalpel to some of the most unpleasant and, he might say also, diseased conditions of the body politic of Europe.

Mr. Neville Chamberlain said in part that when he thought of the marvelous advances which had taken place in surgery during the last half-century, he reflected that they all sprang from but two great discoveries; first of all the discovery of anesthetics by Morton and Simpson, and then the invention by Lister of aseptic surgery, based on the revolutionary researches of Pasteur. To a Minister in his position there was one thing even more important than curing disease, and that was its prevention, and as a layman surgery appeared to him essentially preventive in its nature. Professor Willems of Liège, as president of the International Committee, expressed his gratitude to the Prince of Wales for his presence, and to the members of the British Government who by attending that session had shown the great interest they took in medical science. That was the first time that the International Congress of Surgery was meeting under the lead of a surgeon belonging to the country where the meeting was taking place.

Dr. Leopold Mayer of Brussels, Secretary-General of the Society, said that at the meeting of the International Committee, held on the previous day, July 16, 184 new members had been

admitted, bringing the total membership up to 748, representing 28 nations.

After the conclusion of the opening ceremony Sir William Macewen gave the presidential address. He chose as the subject, "The Study of Nature as Shedding Light on the Structure and Functions of Man." Sir William has long believed and taught that bone is formed only from "osteoblasts," or bone-forming cells, and not from the sheath of the bone, the so-called periosteum. His views are coming into vogue more and more. He related how cases had occurred in which a few of these bone-forming cells had been washed away in the blood stream and had grown in other areas of the body into bony lumps without any assistance from any "sheath." The antler of the deer illustrates this bone-growing process. The "velvet" which first covered it was exquisitely tender. The growth of the bony antler finally interfered with the blood supply of the "velvet," which withered and peeled off, leaving behind the hard and insensitive "horn." Sir William dealt with the problems of skin-grafting involved in the study of "velvet" and the problems of bone-grafting involved in the study of the antler itself. He then went on to mention his famous case, where a complete new arm-bone was built up in a child by small grafts of living bone collected and placed in position. The child was now a man and was able to serve at the front during the war.

The afternoon session was devoted to the discussion of the surgery of the ductless glands. The readers of papers were Dr. Veau of Paris, who dealt with the surgery of the thymus in early infancy; Dr. W. J. Mayo of Rochester, Minn., read a paper on the splenic syndromes; Dr. Willems of Liège and Goormaghtigh of Gand on the surgery of the suprarenal capsules; Mr. Percy Sargent of London on pituitary surgery, and Dr. J. Lorthioir of Brussels, on the surgery of the thymus.

Dr. Veau pointed out that surgery of the thymus was of great use. It helped to save many young children. Thymectomy was an easy, safe operation and always efficacious. X-rays had proved their beneficent action on the gland, but sometimes x-rays were useless and had been found to be deadly. If such accidents became frequent, surgery would again be the treatment of choice. Thymectomy was always indicated in an urgent case.

Dr. William J. Mayo said that 295 splenectomies had been performed in the Mayo Clinic for various conditions. All deaths occurring in St. Mary's Hospital were classified as due to the operation, without regard to the length of time following operation. The cases were tabulated as follows: Splenomegalias due to micro-organisms: 1. Syphilis, chronic, eight splenectomies, one death in hospital, good results in

seven. 2. Tuberculosis, four splenectomies, one death in hospital, good results in three. 3. Pyogenic organisms, fourteen splenectomies, four deaths in hospital, good results in six; no patient with septic endocarditis was cured; 4. splenic anemia, eighty-two splenectomies, nine deaths in hospital, good results in the great majority of the remainder. A number of the patients who made good recoveries had typical Banti's disease with advanced portal cirrhosis. Ten patients had gastric hemorrhages during the first six years following operation. Hemolytic icterus: Forty-two splenectomies, one death in hospital; forty patients recovered perfectly. Sixty per cent. of the patients had co-existent gallstones which required operation. Pernicious anemia: Fifty-seven splenectomies, three deaths in hospital; no deaths among the last forty patients prepared by blood transfusion. The improvement in all was much more prolonged than that following blood transfusion alone. Ten plus per cent. of the patients were alive and able to work more than five years following splenectomy, and 22+ per cent., more than three years after operation. There were no cures, but the abnormal blood picture improved. Splenectomy in pernicious anemia was justified in only a limited number of carefully selected cases. Elderly patients with advanced conditions, and aplastic types of the disease, should not be considered for surgical treatment. Polycythemia rubra vera: One splenectomy, great improvement; the patient was able to work. Hemorrhagic purpura (essential thrombocytopenia): One splenectomy, in advanced stage of disease; good recovery. Splenomyelogenous leukemia: Twenty-nine splenectomies, one death in hospital, great temporary benefit in twenty-eight. Six were alive and able to work, one more than six years following operation. The condition of the blood was improved but not normal. There was less anemia and less evidence of toxemia in splenectomized patients. The fifty-nine miscellaneous cases, many of which had not been accurately classified, were not discussed in Dr. Mayo's paper.

Dr. Charles Willems of Liège, who read a joint paper by Dr. U. Goormaghtigh of Gand and himself, said in part that in the classification of the suprarenal tumors, the important fact was the morphologic, functional and embryologic distinction of the two parts which form the gland, the cortical and the medullary. In the same degree as modern research tended to attribute the predominant physiologic rôle to the cortical, so it happened that the cortico-suprarenalomes were the most frequent. As for the tumors of the medulla, which were the more rare, these belonged to two groups,—those of the nervous sympathetic origin and those of chromaffin origin. The authors reviewed the symptomatology. Whatever might be the opinion of

the physiologists with regard to the significance of adrenalin in the physiology of the suprarenal, the clinicians continued to admit the suprarenal insufficiency resulting from a total deficiency in the suprarenal functions, and not a deficiency of adrenalin alone. In addition the syndrome of Sergent-Bernard presented an acute form, corresponding to the destruction of the glands, and a lighter form which corresponded, probably, to partial lesions and was still a matter for controversy. The acute form had the appearance of an intoxication, while the chronic form presented a principal symptom, hypotension and asthenia. The syndrome showed the alteration of the gland without giving any information as to the nature of the alteration. The excision of one of the healthy suprarenals, with the idea of lessening the amount of suprarenal substance, had been performed, especially for epileptic fits. This was done in accordance with the opinion of some physiologists who held that such convulsions did not depend upon the central nervous system, but upon the endocrine glands. The results obtained were interesting, but the problem was far from being solved. The removal of the suprarenal gland had also been performed in cases of hypertension, so as to reduce the suprarenal functions. Of the two ways which had been used for the extirpation of the healthy suprarenal, the transperitoneal one was not the widest, in spite of its appearance. The retroperitoneal way, done according to the technic of the authors, was more advisable, being more accurate and giving the required view.

Mr. Percy Sargent of London drew attention to the fact that considerable progress had been made since Victor Horsley's pioneer operations of more than twenty years ago, but that there was still much to be learned. As far as the surgeon was concerned, the two chief questions which presented themselves were: 1. What can an operation be expected to accomplish? and 2. Which is the best method of operative procedure? Operation might be directed to (a) influencing the secretory output, (b) relieving local pressure symptoms, (c) relieving general intracranial pressure. Total removal of a pituitary tumor was impracticable, but partial removal might be of great benefit. In some cases a simple decompressive operation was all that could be done, and might be very beneficial, even as regards vision. The causes of failure, in the author's opinion, were: 1. Errors of diagnosis, leading to misdirected operations. 2. Massive intracranial extension of the tumor, rendering the case unsuitable for any operation except a palliative decompression. 3. Operative accident. 4. Postoperative pituitary toxemia. 5. Postoperative pneumonia. 6. In trans-sphenoidal operations, septic infection. Mr. Sargent thought that the osteoplastic frontal approach

was the procedure of choice in most cases, the trans-sphenoidal operation, although presenting certain advantages, being incapable of affording more than partial and transient relief. Advance in pituitary surgery must come about through improved diagnosis, wiser selection of cases and earlier operations.

Dr. Lorthioir of Brussels said that he advised and practiced thymectomy in cases of thymic asthma, respiratory insufficiency, atresy, general debility, etc. He assimilated this operation to extirpation of adenoids, and believed that, in a more or less early future, it would be practiced as often as the latter. He concluded as follows: 1. Thymectomy could be total or subtotal. 2. To be easy and without danger it must be submembranous. 3. The operation was most benign, even for very young or marasmic children. 4. Operative or postoperative mortality was nil. 5. Indications were very numerous, and with practice more would be discovered. Besides thymic asthma and stridor, narcotic intolerance must be added; spasmodic laryngitis, such as false croup; general debility through respiratory insufficiency, as was presented in chronic adenoids; arrest of intellectual development; lasting inaptitude for work, and so on. In the discussion that followed, Dr. A. Henry of Dublin, Dr. Voronoff of Paris, Dr. A. Kocher of Berne, Dr. A. Froell of Stockholm, Dr. Banting of Toronto, Mr. Baek of London, and Mr. Pybus of Newcastle-on-Tyne, took part.

Dr. Serge Voronoff of Paris, who has been in the limelight for some time on account of his gland transplantations, described at some length his methods and results. He pointed out that as early as 1919 he presented to the French Congress on Surgery the results of 120 testicular grafts made in rams and he-goats. Since that time he had been interested in testicular grafting in man. In view of the difficulties of obtaining human graft material, it occurred to him to utilize the testicles of monkeys. Dr. Voronoff declared that the facts had shown the correctness of his reasoning and, moreover, men of so high professional reputation as Dr. Baudet, surgeon at the Hôpital Bichat, Dr. Dartigues of Paris, and Mr. Ivor Back, surgeon of St. George's Hospital, London, were preaching, in Paris, the grafting of testicles from monkey to man. Up to the present time Dr. Voronoff had done forty-four such graftings. In some cases, the testicles were obtained from chimpanzees, in others from cynocephalic monkeys, and in one instance a human testicle, taken from a case of cryptorchidism, was employed. The patients included six physicians. He did not give a detailed report to the Congress of the forty-four cases, but the report will be made at the Congress on Pathology, which meets in Rome next October. Since 1917 he had continued to seek a method ensuring a long survival in grafts.

Grafts taken from very young monkeys had failed to produce in the human organism the changes occurring when the grafts had been obtained from adult monkeys. He now employed only adult chimpanzees and cynocephalic monkeys, whose puberty and virility were unmistakably evident. Also the site method of grafting was all important. After many experiments made since 1917, he had discovered that, at least for the testicle, the best region for grafting was the external surface, or, preferably, the internal or visceral surface of the vaginal tunic of the testicle. Grafting within this favorable site demanded a special method which Voronoff had elaborated. He found out that the surface of a given area could irrigate and nourish only a limited number of grafts. During his first studies he grafted an entire testicle which was followed by necrosis of some of the fragments, because the surface of the tunic was insufficient to supply the necessary capillaries. By distributing the six fragments between the two vaginal tunics each tunic thus nourishes half the testicle and no fragments become necrotic. The technic was given in some detail, but there is no space to set down the author's words at length. Mr. Ivor Back, in supplementing and endorsing Dr. Voronoff's statements, said it was unfortunate that his scientific work had made such an appeal to the sensational that the lay press and even the music halls had made capital out of it, and the result had been to obscure his true views and to bring discredit upon scientific work that was very real. Dr. Voronoff's technic had been verified by long and arduous research and a series of almost disheartening failures. He—Mr. Back—had had an opportunity of talking to Dr. Voronoff's patients and they gave him the most convincing accounts of the benefits they had received from the operation, and of the improvement in their general well-being. They were all educated men, either doctors or professors, and it was difficult to believe that the effect was due to auto-suggestion, as had been put forward in some quarters, but, on the contrary, was scientific work that was worthy of further investigation.

Dr. Banting of Toronto spoke very briefly concerning insulin. He only claimed that it was useful to ward off diabetic coma and to rid the system of sugar, so that, if necessary, an operation could be performed, and that in combination with diet, and scientifically administered, it was a remedy for diabetes. He deprecated the putting forward of any claim that insulin was a cure, but expressed the hope that further experiments and investigations might result in improving the therapeutic value of insulin. His modest and unassuming manner created a very favorable impression.

On July 18, the papers and discussion were concerned with arthroplasty. Mr. E. Hey

Groves of Bristol read the first paper. He defined arthroplasty as an operative procedure upon an ankylosed joint with the object of restoring mobility. Clinical evidence as to its results were conflicting. There was ample evidence that operative mobilization of the elbow was usually followed by greatly improved function. On the other hand, arthroplasty for the hip and knee often led to disappointment.

Dr. V. Putti of Bologna, who has done 142 arthroplasties since June, 1913, said it was a long and traumatizing operation and should only be resorted to in the case of patients who were favorably disposed from the point of view of organic resistance. The most favorable age was between twenty and fifty. It was absolutely indispensable, that the patient with his good will and energy should cooperate with the doctor. Consequently, never operate on patients either hypersensitive or neuropathic or irritable or mentally deficient. Neither should there be any question of an operation when the patients' means did not allow a prolonged stay in a hospital. The traumatic ankylosis were the most favorable. Osseous ankylosis were more favorable than fibrous. Ankylosis from tuberculous arthritis should be operated upon only as an exception. Good results might be obtained in case of war ankylosis, arthritis deformans of the hip, polyarticular arthritis. Never operate less than a year after the disappearance of the more striking symptoms of the stiffening process. Some beautiful films were put on the screen illustrating Dr. Putti's address. The various stages of the operation were shown and Dr. Putti had on the platform with him four of the patients, brought from Italy as ocular evidence of the success of the operation.

Dr. W. Russel MacAusland of Boston, Mass., discussed the present status of arthroplasty, particularly emphasizing the point that this operation was not an excision. He pointed out that Murphy, the pioneer of the mobilization of ankylosed joints, had well said that arthroplasty to be functional must be stable, and excision of joints resulted always in flail joints. Excision had no place in the surgery of weight-bearing joints, save to obtain ankylosis, nor would it be used in non-weight-bearing joints if it were not that flail joints might be stabilized by means of light apparatus. He presented the subject of arthroplasty, therefore, in order to stress these important points: 1. That excision of a joint did not constitute arthroplasty. 2. That highly developed technical skill was absolutely necessary. 3. That judgment in the selection of cases was very difficult. The different types of ankylosis were defined and the causes and extent of the condition in relation to mobilization were described. The indications and contraindications for arthroplastic procedure were pointed out; the methods of treatment previously

used were passed in review and the development of arthroplasty from the time of Verneuil in 1860 to existing methods were sketched. Attention was drawn to the fact that the methods in use today as outlined by Murphy, Payr, Baer, Allison and Brooks, Putti and the author had in common the exposing of the joint surfaces, modelling of the bone-ends after the conformation of the normal joint, and the interposition of a substance to obstruct effectively bony union. They differed particularly in the substance interposed. The two essential features of the Murphy treatment were the interposition of the pedicled fat and fascia flaps and the application of traction. Murphy emphasized the inclusion of the fat, as he believed it essential to a new joint formation. It was his belief, too, that the flap was nourished through the pedicle. The author believed that pedunculated flaps were entirely unnecessary, and that when covered with fat they interfered with the highest technic. In the experience of the author free fascia for transplantation had proved most successful and had given most uniform results. Dr. MacAusland made a detailed study of each joint, stating the indications and contraindications for operation, and described the general methods of treatment. Each joint considered suitable for arthroplasty was illustrated by drawings of operative technic, by carefully tabulated records, photographs and so on, of not only the author's cases but of those of other surgeons. The paper was, perhaps, the fullest ever written on the subject, and like that of Putti, was clearly illustrated on the screen. The author was in favor of arthroplastic measures in selected cases of ankylosis, especially of elbow, hip, and knee joints.

Mr. Elmslie, London, said that the mere fact that a stiff joint was made to move by operation was sometimes more a matter of satisfaction to the surgeon than to the patient, who was often more concerned with the question as to whether there was or was not pain. Mr. Elmslie said he had examined hundreds of children suffering from hip disease, and there was no doubt that the boys and girls with bony ankylosis of the hip could walk miles further than other children. Mr. Whitelocke of Oxford said that after the discussion they must be skeptics if they were not convinced that it was possible under certain conditions to make functionally perfect joints by arthroplasty. Many theoretical points were left unanswered, but at the moment Dr. Putti had carried the day.

On July 19 papers were read and discussions held on the late results of injuries to the peripheral nerves.

Dr. Henriksen of Skein described the results of surgical treatment of injury of the nerves. Dr. Gosset of Paris described the results obtained in the surgery of wounds of the periph-

eral nerves by projectiles of war, and laid stress on the point that two types of cases were to be distinctly distinguished. In war surgery, as well as in civil surgery, immediate suture of the nerves should normally be completely successful. Delayed surgical treatment might give good functional results in 40 or 50 per cent. of the cases, according to the nerves, when it had been performed from one month to two years after the wound. After that time it should, nevertheless, be tried; it might be successful, but Dr. Gosset agreed with most medical authorities that there was less chance of its succeeding. However, the surgical treatment of the big nervous trunks was by no means illusory if it was carefully and systematically practiced by specialists who were equipped for that purpose, and when the patient could be kept under prolonged observation.

Dr. Charles H. Frazier of Philadelphia read a paper on gunshot wounds of peripheral nerves. The following is a summary of the paper: 1. General classification of the 3000 gunshot wounds of the peripheral nerves treated in the Reconstruction Hospitals under the control of the Surgeon-General's Office, U. S. A. Distribution of lesions. The percentage of complete and incomplete lesions. 2. The incidence of spontaneous recovery. The time elapsing between injury and return of: (a) motor function, (b) sensory function. The percentage of partial and complete spontaneous recoveries. Miscellaneous considerations. 3. The total number of operations. Percentage of nerve sutures, nerve liberation, nerve transplants. Discussion of technic. Results as to recovery, partial or complete, improvement, failures. Elapsed time between operation and return of function. Ultimate rate of disability in unrecovered cases.

Dr. G. Verga of Paris read a paper on the end-results of surgical intervention for traumatic lesions of the nerves. He said that the percentage of improvement and of recoveries obtained by him out of eighty-two cases, observed for longer than one year after intervention had taken place, was as follows: 52.4 per cent. of recoveries, 37.8 per cent. of improvements, 9.7 per cent. of negative results, including among the recoveries even cases where a slight loss of strength or of total functionability of the member had been observed, and considering as improved all the cases, where, after an operation had taken place, any favorable modification of the symptoms had shown itself.

Mr. Harry Platt of Manchester and Mr. W. Rowley Bristow of London contributed a paper on the remote results of operations for injuries of peripheral nerves. They concluded as follows: 1. The results of end-to-end suture. The results of end-to-end suture in the case of gunshot lesions were for the most part imperfect, both from neurological and economic

standpoints. In an average large series of consecutive operations complete failures would be found in about 20 per cent.: (a) The musculospiral nerve headed the list of recoveries and might be expected to show practically complete restoration of function in at least 50 per cent. of the successful operations. (b) The ulnar and median nerves gave disappointing results on the whole. In the former, complete recovery of the intrinsic muscles of the hand was so rare as to be almost unknown; in the cases showing recovery, neurotization of the hypothenar muscles alone was fairly constant. The economic results, however, in this nerve were often good, except in individuals whose occupation demanded the finer coordinated movements of the fingers. In the median the sensory recovery was always inadequate, and this factor was the cause of the characteristically great depreciation in the function of the hand. In sutures of the median in the forearm, complete failure of recovery in the thenar muscles was frequently seen. (c) The results of sciatic nerve sutures were uniformly poor, and a considerable number of such limbs came ultimately to amputation.

2. The outstanding causes of failure or imperfections, apart from gross errors in operative technique, were: (a) prolonged periods of delay between the infliction of the injury and the operative repair of the lesion; (b) topographical confusion in regeneration; (c) interstitial fibrosis above the level of the line of suture.

3. The operations of indirect nerve repair, with the possible exception of nerve grafting, had proved completely ineffectual, and should be eliminated from the repertoire of peripheral nerve surgery. Investigations of the results of a limited number of nerve-grafting operations in Great Britain suggested that these procedures were of little value.

4. In the nerve lesions associated with profound irritation, causalgia, resection, and suture, the intraneural injection of 70 per cent. alcohol would rarely fail to bring about immediate and complete relief of the pain.

On July 20, the subject of sero-therapy and vaccino-therapy in surgery was considered.

The opening paper was contributed by Major Parker Hitchens of Washington.

Major Hitchens said in part that the serums and vaccines in more or less common use had been developed upon a theoretical basis of strict specificity. Observation had revealed a factor in clinical improvement which was not always clearly due to specific reactions. This had disturbed our views to such an extent that many persons credited to specificity little of the benefit which might follow the therapeutical use of this class of substances. Until we had definite knowledge concerning the mechanism of the "side" effects, however, any discussion of the value, in prophylaxis and treatment, of serums and vac-

cines must still consider them exclusively from the standpoint of specificity. In surgery, with tetanus eliminated, serums and vaccines had been used to no great extent for prophylactic purposes. Preventive inoculation before operation had nowhere achieved a place in the routine preparation of the patient. For the prevention of gaseous gangrene in trauma of the war wound type we had, from the great amount of work done during and since the war, considerable hope that continued research would yield a preventive and possibly a curative serum. Intolerance or hypersensitiveness restricted the use of serum chiefly to acute infections. The streptococcus was the most important of the bacteria to the surgeon, but in the treatment of acute streptococcal infections, antistreptococcus serum was not a dependable remedy, and as prepared and used, was probably devoid of specific value. Antigenococcus serum, promising theoretically and of some value experimentally, in practice was not followed by dependable results and which were not clearly specific. The favorable results which had attended the early use of carefully prepared and tested antianthrax serum seemed to warrant its use in large doses wherever it might be indicated. With the exception of such infections as diphtheria, which were only incidentally of surgical importance, there was no other surgical disease or complication of bacterial origin for which there was a specific serum of sufficient value to warrant discussion. The forces which were most potent in the popularization of bacterial vaccines did not compel a realization of the fact that injection of the antigen might constitute a comparatively unimportant part in the immunological management of an infection. It was a fundamental assumption of vaccine therapy that the injection of a bacterial suspension was followed by the production of specific humoral or circulating substances antagonistic more or less directly to the infecting bacteria. The evidence which supported this assumption was not complete nor satisfactory, but even if we ignored this and granted the presence of resultant, increased, circulating bacteriotropic substances we were still in no position to predict clinical improvement. According to the prevailing theory, this must follow only when bacteriotropic substances, infecting bacteria, and phagocytic cells were able to come into effective contact with one another; in other words, when conditions within the focus of infection effectively imitated those of the capillary in the opsonic index demonstration.

The infection itself was probably the direct result of some condition which interfered with such contact, and its course depended largely on the permanence and completeness of such interference. There seemed as much reason to believe that other measures of no specific origin

or relation, which would increase the accessibility of the host, might be just as effective clinically as the specific treatment under discussion. Was it not possible that exactly this was what non-specific protein shock accomplished when it was successful? The rôle and value of measures intended to produce the necessary "flooding" of the focus were well discussed by Wright himself, but almost nobody else had added to his teachings upon this phase of vaccine therapy, and apparently few of those using vaccines now gave it more than secondary consideration. Furthermore, this pioneer in the field had not differentiated clearly between the infections in which effective imitation of *in vitro* conditions was possible and those in which it was practically impossible, and his associates and followers seemed to have ignored such classification. It was impossible now to estimate the influence of this failure in practice upon the present position of vaccine therapy or upon the opinion of persons who had attempted to review critically the clinical results. It must be evident that the number and variety of infections susceptible of being so manipulated that they would conform to the obvious requirements were exceedingly limited. The only surgical infections which seemed regularly amenable to vaccine therapy were those caused by the staphylococcus. In general, the superficial infections due to this microorganism responded favorably to treatment with staphylococcus vaccine, and the vaccine, likewise, had preventive value. No other vaccine had given results which occurred with regularity or which were clearly specific. The definite improvement which sometimes followed protein shock had resulted in a desire to apply such measures more extensively. Inability to control the degree of shock elicited was responsible for the little progress that had been made along this line. The validity of the demand for a nonspecific protein as the agent for eliciting protein shock in a given case was seriously questioned. If a bacterial vaccine whose content corresponded as closely as possible with that of the infecting organism was used, there seemed a possibility of calling into play more efficiently, specific reactions as well as nonspecific ones. The chief obstacle met in attempting to estimate the value in surgery of specific serums and vaccines was the fact that there had been published but few reports of observations which had considered the infection, not only surgically and clinically, but also histologically, bacteriologically, and immunologically. Until their application had received extensive critical and controlled study from all these points of view there must still be in any group of surgeons individuals who represented all the varieties of opinion, from that which held serums and vaccines of all kinds to possess great value, to that which main-

tained them to be completely devoid of specific therapeutic worth.

Dr. Louis Bazy of Paris read a paper on serotherapy and vaccinothrapy in surgical infections. He said in part that if a knowledge of the paraspecific effects of serums and vaccine matters had its utility, we must also take into account that in the actual stage of science we were not able to make full use of the resources offered by serotherapy and vaccinothrapy if we failed to recognize the notion of specificity.

According to Bazy, generally speaking the use of serums was advisable, whenever deemed necessary, not only as a curative remedy, but to obviate infection, to produce a quick effect that did not need to be lasting. Serum was a medication to be used in cases of urgency. With vaccine matters, only slow effects were to be looked for, but they were more lasting. Serotherapy and vaccinothrapy were of valuable assistance to the surgeon when operating. They were able to facilitate surgical treatment or to localize it. But surgical treatment lost nothing of its importance, because neither serums nor vaccines were of any use in cases of necrosis or cicatricial lesions. The greatest attention should be paid to signs of susceptibility to microbes on the part of germ bearers, for most cases of operative shock were caused by the sudden and startling development of a microbe, whose powers of resistance had grown under conditions that had become less able to counteract them. The skillful use of serotherapy and vaccine matter enable us to anticipate this susceptibility and counteract it.

Sir Almroth Wright, who is not only a medical scientific research worker of the very first rank, perhaps the first in the world in his particular line, but an easy eloquent speaker and possesses in a high degree the gift of clear exposition, said that it seemed that we ought to be able to protect ourselves against certain infections. Means for protection against typhoid had been found. Incidentally he pointed out that operating for cancer was not always an aseptic procedure, as in cases of cancer of breast, for instance, there was often infection by streptococci. He explained why in practice it was so difficult to destroy microbes, often impossible, while in experiments it was fairly easy. The antiseptic agent did not attack the microbe first, but tended to dissipate its strength on the albuminous fluid in which it was contained. Sir Almroth Wright thought that the lessons of the war had shown plainly the comparative uselessness of antiseptics in surgical practice. He, moreover, believed, with Pasteur, in the prophylactic treatment of infection. Pasteur also said that in the early stage of infection he could do something, but after that efforts were futile. Wright drew attention to the fact that by relieving intoxication, the poisoned leucocytes

might be rendered in such a state that they would be enabled to do their work, at any rate, to some extent. Pasteur believed in living vaccines but Wright had discovered value in dead ones.

The speaker discussed the merits of different forms of vaccine, and said that in his opinion stock vaccines were of greater use than autogenous. He emphasized the points that the manner of administration of vaccines was important, and that the proper dose was especially important, although this latter point was ignored by many.

At 2 P.M. on the afternoon of July 20 demonstrations on vaccine therapy were given by Sir Almroth Wright, at his laboratory at St. Mary's Hospital. On every afternoon during which the Congress was in session, clinical demonstrations were held in almost all the London hospitals. Dinners and receptions galore were given and every effort was made to interest and amuse the visitors, among whom were a large number of ladies. No more representative gathering of great medical scientists has ever taken place; the lists scintillated with names of world-wide reputation. The American medical profession was splendidly represented, and in every respect—scientific, practical, and social—the sixth Triennial Congress of the International Society of Surgery was a marked success.

The last question discussed at this Congress was that of operative shock. Dr. George W. Crile of Cleveland read a paper entitled an electro-chemical interpretation of shock and exhaustion. He gave it as his opinion that there is much evidence in support of the conception that men and animals are electro-chemical mechanisms constructed on the pattern of the constituent cells, each of which is in itself an electro-chemical mechanism. His hypothesis is that the body as a whole is an electro-chemical mechanism, the positive pole being the brain, the negative the liver, the connecting wires the nerves, the salts in solution, the electrolytic fluid in which the electro-chemical mechanism is immersed. This hypothesis, it seems to Dr. Crile, would interpret the fact that in surgical operations, if a state of negativity and the internal respiration are maintained there will be no surgical shock. Dr. Crile holds that the state of negativity is maintained by: (a) Exclusion of fear by management, by operation in the patient's room, by morphin, by analgesia. (b) Exclusion of traumatic stimuli by local or regional anesthesia, by gentle handling, by protection of the wounds from the irritation of air. (c) Exclusion of stimulation by stimulant drugs. (d) The entire process whereby the state of negativity is secured and the internal respiration,

difference in potential, of the cells is included in the combination of methods of pre- and post-operative management and of surgical technique which is called association. The internal respiration is maintained by fluids, by warmth, by blood transfusion, by sleep, and by the avoidance of deep inhalation anesthesia.

Drs. E. Quenu, Pierre Duval and P. Moequet of Paris contributed a paper on traumatic shock regarded from the clinical standpoint.

In addition to the recognized type of shock these authors have given a description of a type of mitigated shock, often met with in ordinary surgery, caused, like the former, by attrition of the tissues, and which requires to be dealt with by means of similar therapeutic treatment. The prognosis of traumatic shock may be calculated by the central temperature, the analysis of the arterial tension, and by the analysis of urine and blood. The recovery of the urinary function, a discharge of urea, and the diminution of azotemia are the best signs of a favorable prognosis.

The therapeutic treatment includes prophylactic measures and the treatment of shock when such has been ascertained to exist. The best surgical treatment consists in the excision of the wound; immunization by means of an anti-shock serum has not yet given proof of its efficacy, at least from a clinical point of view. The treatment of an ascertained shock may be either symptomatic or causal. The former is especially useful as a means of first aid. Causal treatment is founded on the new notion of shock. Shock is an intoxication, the seat of which is the traumatic lesion; it is consequently there that efforts should be directed. Theoretically, what is required is the excision of the wound where the noxious albumins take their rise. Practically, we are confronted with two sets of circumstances according as the limb affected should or should not be amputated. In the latter case we should have recourse to a "primitive" amputation, the word "primitive" being used in place of that of "immediate," for reasons which the authors deem good. In the former case the treatment should consist of a thorough excision of the wound, and the devitalized parts should be cut off as far as possible; in any case the seat of the malady should be thoroughly cleansed. The future progress of the wounded subject depends principally on prompt treatment.

Dr. John Fraser of Edinburgh read a paper on shock in which he dealt with the subject from all angles.

The Congress was well attended and a great success from all points of view.

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BULLETINS RELATING TO THE ILLNESSES OF PROMINENT PEOPLE

THE public is generally interested in the personal affairs of prominent people, and especially so in the illnesses of public servants. This interest is acute when centered on the President of our country. Publishers of news must of necessity meet the demands of the masses so far as persistence and ingenuity can secure the details of an affliction from which a President or other person on whom public attention is focussed may be suffering. Newspapers have a perfect right to report the known facts if such knowledge is honorably acquired. May we not properly raise a question as to the quality and extent of bulletins issued by attending physicians in such cases?

To some people it may appear that even a President of the United States might feel that when sick only a general announcement of that fact should be published, for an illness is such a personal matter that he might be excused if he demanded that a detailed discussion of the causes and behavior of his disease should be kept within the circle of his advisers and intimate friends. Others may contend that the President belongs to the Nation, and that his

functions are so important that the people have a right to know the nature and probable result of his disabilities. Between these two propositions there may be a middle ground of conservative reticence.

We are inclined, however, to feel that medical bulletins of this nature should put forth much more or much less than the confusing statements which appeared over the signatures of President Harding's physicians.

After the death of President Harding, a statement was published setting forth that there was an enlargement of the heart, and now the death certificate proclaims that he died of cerebral apoplexy following an acute gastro-intestinal infection including cholecystitis and bronchial pneumonia* with arterial sclerosis of several years' duration. Since there is no report of an autopsy it may be assumed that there was none and, therefore, the certificate must have been based on clinical findings.

It is perhaps unseemly even to suggest criticism—certainly none is intended—of the clinical diagnosis based on examinations, but there must be wide differences of opinion regarding the wisdom of allowing a patient with longstanding arterial sclerosis, with the concomitant condition of an enlarged heart, to subject himself to the vicissitudes of long journeys, that necessarily involved unusual excitement and fatigue. President Harding was elected because the majority felt that he was the best available candidate, and after election his life should have been safeguarded so far as medical sagacity could be brought to bear.

Yet the attending physician proclaims in an alleged statement published in the Boston Herald of August 9, and presumably in other papers, that President Harding confided to some of his personal friends that he believed that he would never live to return to Washington. Knowledge of this gloomy forecast, presumably known by his physician since it was reported by him, taken with the statement that Mr. Harding's condition became worse from the time that the party left St. Louis, warrants the belief that the then President should have been induced to abandon the itinerary. This feeling finds further support in another part of the published statement to the effect that Mr. Harding never fully recovered from his illness last spring, and that he was in much worse condition than was officially announced. He was, therefore, a sick man even at the time of starting on the journey to Alaska.

The office of President of the United States is of such major importance that only one physically fit should be a candidate for that position, and if a prospective candidate is not fully informed of underlying physical weaknesses someone may be blameworthy for a life sacrificed, for the demands on the vitality of a Pres-

*Broncho-pneumonia (?).

ident of these United States are more than an impaired physique can meet with safety. If, during his term of office, he is found to have an organic disease, he should be carefully supervised and guarded from undue strain.

The great importance, yes, the necessity, of having men physically fit, as well as mentally equipped to fill the position of President, warrants the feeling that the Nation is entitled to know more about the health of a prospective President than has been the custom heretofore.

In the published statements setting forth facts relating to the physical condition of a President it seems to be in order to require of attending physicians that they confine the text of bulletins to statements of fact and only indulge in the expression of opinions that are warranted by the facts.

Some of the bulletins relating to the late President were evidently intended to convey the information that he would recover his health. Expressions of this character were not logical or fair, because the statements made subsequent to Mr. Harding's death, together with the certificate of death, indicate that he could never have been a well man again.

We trust that our future presidents will accord to scientific medicine that recognition of its dignity which would be shown by the selection of the broadest minded and best trained physicians for their personal advisers, and that these advisers will not shake the faith which the public should have in scientific medicine by the publication of illogical and misleading statements.

RESIDENT AND TRAVEL SCHOLARSHIPS FOR PHYSICIANS

THE American Child Health Association has published an offer of Resident and Travel Scholarships for physicians. Ten thousand dollars is available to physicians who wish a broader training, and also to those who would like to visit demonstrations and health centers.

These awards will be made soon, hence those intending to take advantage of these opportunities should apply at once to the administration office, 370 Seventh Avenue, New York City. The purpose is to meet the growing demand for more and better trained physicians in the field of child health. These scholarships will be in operation during the rest of this year and through 1924. This is an unusual opportunity for those interested in child health activities.

DEATH RATE OF METROPOLITAN LIFE INSURANCE POLICY HOLDERS

THE statistical bulletin of this company for July, 1923, sets forth the facts that the tubercu-

losis mortality is declining to the extent of 5.3 per cent. among the white policy holders and 2.4 per cent. as compared with the record of the first half of 1922. Cancer mortality has shown a drop of 4.2 per cent. among the white and a small decline among the colored policy holders.

The mortality from disease incident to pregnancy and childbirth has shown pronounced improvement.

If the considerable drop in the diphtheria rate is maintained throughout the remainder of the year, the 1923 mortality from this disease will be lower than has ever been recorded among the policy holders.

Mortality from measles and whooping-cough is higher.

Mortality from alcoholism is reported to be rising in the United States, but remains low in Canada.

Fatal accidents are more numerous thus far than in 1922 and 1921.

Questions are raised in the bulletin as to the emphasis and undue confidence which have been placed on so-called standard height and weight tables in the search for under-nourished children, for 75 per cent. or more of the children presenting unmistakable clinical signs of malnourishment are missed through the use of an accepted height and weight table. Reference is made to the joint study by the Life Extension Institute and the Metropolitan Life Insurance Company of the causes of high blood pressure, and the conclusion is reached that our ideas must be revised as to the importance of overweight, high protein diet, the existence of focal infections, and the excessive use of tobacco; for although all of these factors, either singly or in combination, have been found to exist in cases of abnormal blood pressure, only overweight is consistently found in cases showing a markedly higher percentage of high blood pressure.

All of these findings are shown in charts which are significant.

ADVANCES IN DIABETIC TREATMENT

FOLLOWING almost within the year on the startling announcement of insulin, come new discoveries which may further revolutionize the treatment of diabetes.

Dr. Max Kahn of the Beth Israel Hospital of New York has produced "intarvin," a new fat of 17 carbon atoms to the molecule, intermediate between the ordinary fats containing 16 and 18 carbon atoms, and incapable of breaking down in acid products, as do the natural fats.

This new product is beginning to be manufactured on a commercial scale; it is quite edible, and apparently is a satisfactory substitute for natural fat in the diet.

The second discovery is that of "glucokinin" by J. J. Willaman, associate professor of bio-

chemistry in the University of Minnesota. Glucokinin is the vegetable analogue of insulin, and is derived from the plants and lower animals containing glycogen. Glucokinin apparently possesses all the properties of insulin, but may be derived from such lower animals as clams and oysters, and from such vegetables as mushrooms, lettuce, wheat, and onions.

THE INFLUENCE OF TEMPERATURE ON THE TOXICITY OF INSULIN

In Public Health Reports for August 3, 1923, Carl Voegtlin and Edith R. Dunn of the United States Public Health Service report experiments conducted on white rats which indicate that insulin has greater toxicity under relatively higher temperatures. The results of these experiments are shown in the following table:

The effect of atmospheric temperature on the toxicity of insulin.

15° to 17° C.				18° to 22° C.				28° to 30° C.			
Dose of insulin per kilo of body weight.	Number of animals used.	Mortality (per cent).	Average time of death (hours).	Dose of insulin per kilo of body weight.	Number of animals used.	Mortality (per cent).	Average time of death (hours).	Dose of insulin per kilo of body weight.	Number of animals used.	Mortality (per cent).	Average time of death (hours).
0.2	30	3	26.5	30	3	9.3	30	20	2.4		
0.6	30	36	19.6	30	20	13.9	30	80	2.6		
1.2	30	43	14.9	30	43	5.0	30	100	1.7		

No suggestions are presented in this report relating to the influence of temperature on the behavior of human beings under treatment by insulin.

Miscellany

NOTES FROM THE BOSTON MEDICAL LIBRARY

From a generous benefactor the Library has acquired a fine copy of the 1497 Aldine edition of Nicolaus Leoniceus' "De morbo gallico," one of the earliest of the Renaissance tracts on syphilis.

Leoniceus, born in 1428, died in 1524, was professor of medicine at Padua, Bologna, and Ferrara, a friend of Linaere, and an elegant Latinist. In addition to his work on syphilis he is famous for the service he rendered to science in correcting the botanical errors in the Natural History of Pliny.

Attention is called to a new periodical, *The Industrial Doctor*, which is the official journal of the New York State Society of Industrial

Medicine. It is well printed on good paper, and contains articles of interest to all having to do with the hygiene of occupations. The May number contains an important article on "Mental Factors in Accidents," by Dr. William R. Woodbury, formerly of Boston, now in Rochester, New York.

An important and little known periodical is the *Japanese Journal of Medical Sciences*. It is published by the National Research Council of Japan, and abstracts into English or German the articles of 102 Japanese medical journals.

A new periodical, the *British Journal of Experimental Biology*, is to begin publication in September. It will be a quarterly, devoted to experimental embryology, genetics, animal behavior, comparative physiology of the lower organisms, and the results of cytological, morphological, and histological investigations of current interest to experimental biologists. The first number will contain articles on endocrine activity in fetal life, studies on the comparative physiology of digestion, parthenogenesis, a study of sex-reversal and hermaphroditism in the domestic fowl and a critical summary on tissue culture. The editor is F. A. E. Crew of Edinburgh; the publishers, Oliver and Boyd of Edinburgh, and the subscription price is 40s. per volume. An important periodical!

The Great War, with the consequent cessation of monographic medical publications of foreign origin, made evident the great lack of American and English monographs on medical subjects. This deficiency has proved a handicap to English-speaking students. It is pleasing to note that there is a tendency among American publishers to take up the monograph, and that D. Appleton and Company, following its successful series of obstetrical and gynecological monographs issued last year, is now bringing out a surgical series, the following five of which have been published under the general title of Appleton's Surgical Monographs.

Cannon, W. B. "Traumatic Shock." New York, 1923. A presentation and discussion of the clinical phenomena, a consideration of the theories of causation, and a summary of the suggestions regarding treatment, by the professor of physiology at the Harvard Medical School, based on a large experience in France during 1917-1918.

Coffey, R. C. "Gastro-enteroptosis." New York, 1923. A concise, authoritative monograph on the ptosis question; based on a large clinical experience and a comprehensive review of the literature.

Neuhof, H. "The Transplantation of Tissues." New York, 1923. According to the author, this is the first work to deal with all varieties of tissue grafts, and is based on ten years' personal experience. It treats of the transplantation of

the skin, cornea, mucous membrane, fat, peritoneum, fascia, muscle, nerves, bone, cartilage, joints, teeth, blood vessels, and organs. It is supplemented with copious bibliographies of the literature of the last twenty-five years.

Pool, E. H., and Stillman, R. G. "Surgery of the Spleen." New York, 1923.

Steindler, A. "Reconstructive Surgery of the Upper Extremity." New York, 1923.

THE PRENDERGAST PREVENTORIUM

ON Thursday afternoon, August 16, the Prendergast Preventorium of the Boston Tuberculosis Association kept "open house" under the care of the Auxiliary, the president of which, Mrs. John D. Henry, conducted the exercises. These included the inspection of the camp by visitors, brief addresses by Dr. John B. Hawes, 2d, president of the Association, and Dr. Cleaveland Floyd, director of clinics of the Out-Patient Department of Boston Sanatorium, and a flag-raising, with games and one or two individual items of entertainment by the children.

For the summer months the school room, not being used for teaching purposes, has been converted into a temporary dormitory, and twelve additional girls, thirty-two in all, are now accommodated by the Preventorium.

Through the courtesy of the Department of Education of the City of Boston, a playground teacher, Miss Marguerite S. Maloney, and a garden teacher, Miss Leonora Lordan, have been detailed for the camp for the summer. From the Boston Public Library, through Miss Alice V. Stevens, chief of the issue division, the children are now furnished with books suitable to their years and understanding.

For one of the recent steps in advance in the administration of the Preventorium there has been the appointment by the Executive Committee of Dr. Joseph Garland as camp physician, assisted by the following group of consultants, representing different specialties: Dr. James H. Young, pediatrics; Dr. Conrad Wesselhoft, communicable diseases; Dr. Thomas H. Lanman, surgical matters; Dr. Lloyd T. Brown, orthopedics; Dr. Robert C. Cheney, eye, and Dr. Harry P. Fink, nose and throat.

CHILD HEALTH CARE IN FRANCE

A "school for child cultivation"—*Ecole de Puericulture*—is the name given to an educational undertaking in France which combines in one organic program of training for child care a whole range of courses in medicine and public health, infant care and school hygiene, community organization and social welfare work, which in the United States are for the most part allocated to separate fields and agen-

cies. Its aim, according to the announcement of the curriculum just received in this country, is in line with the nation-wide movement in France for counteracting "depopulation" and infant mortality by conservation of child life and training and guidance of mothers.

The school was founded through the instrumentality and with the aid of the American Red Cross and is maintained by the Franco-American Foundation. It is under the government of the Faculty of Medicine of the University of Paris. Among the Americans included on its committee of patrons, which is headed by the President of France, are Ambassador Herriek, Robert Olds, American Red Cross Commissioner in Europe, and Dr. William Palmer Lucas, former chief of the department of child welfare of the American Red Cross, and one of the directors of the American Child Health Association, a national organization devoted to the improvement of methods and standards of health care for children in this country and abroad, under the presidency of Herbert Hoover. Dr. Selskar Gunn, of the Rockefeller Foundation, is a vice-president of its administrative council.

Its purpose is to provide courses in study and field training in child health care for doctors, midwives, and "visiteuses d'hygiene," whose work with mothers and babies corresponds to that of visiting nurses in this country. The course was first established to meet the need of trained personnel in this latter work, as a result of conditions which arose during the war. It has succeeded in setting up standard qualifications, in prenatal and feeding care, and work for new-born infants, for professional workers in this field, according to Dr. Walter H. Brown, director of the Mansfield, Ohio, child health demonstration,—a five-year experiment, financed by the American Red Cross and directed by the American Child Health Association, which has been undertaken in this country to demonstrate what a typical American community can do to secure better health development for its children. Dr. Brown inspected the work of the French school on a recent visit to Europe.

The school is authorized to confer two grades of university diplomas of the Paris Faculty of Medicine upon its matriculants, one for doctors and students of medicine, including both French and foreign students, and the other for midwives and nurses, who must, likewise, pass the regular examination for this award.

THE HISTORY OF THE MASSACHUSETTS MEDICAL SOCIETY

THE Secretary, Dr. Burrage, reports that satisfactory progress is being made in the printing of this volume. The number of pages will run close to 500. The index is being carefully revised by the author and will be of great value.

The interest shown and the increasing number of subscriptions indicate that the value of this publication is recognized. Already about half of the expected subscriptions have been received and several sections of the State have not been heard from.

Every District Society should be actively at work securing subscriptions, for the influence of the Society will be promoted through a better knowledge of its history.

DIABETIC COLUMN

INSULIN makes the prognosis of severe diabetes less grave than in previous years, because coma has a much reduced mortality and can be more easily prevented. The diabetic, however, is still prone to infections of one sort or another, and must be protected from infections as carefully as ever.

The diagnosis of pulmonary tuberculosis in a diabetic patient is often difficult by the ordinary clinical methods of history-taking and physical examination. On this account it is most important to examine the lungs of all diabetics with particular care.

During the last six months we have demonstrated the presence of active tuberculosis in four unsuspected cases of diabetes, no one of which had fever of more than 99°, persistently accelerated pulse-rate, cough or sputum. One of these cases arrived at the hospital in diabetic coma.

I do not know how commonly active pulmonary tuberculosis now occurs as a complication of diabetes. Judging from the cases which I have seen during the last year, however, it is relatively common, at least as common as syphilis, furunculosis, or other acute infections. It seems worth while to bear this fact in mind, and to remember that any case of diabetes may harbor active pulmonary tuberculosis without a suggestive history or obvious physical signs. In order to treat cases to best advantage with insulin, accurate diagnosis is essential. Tuberculosis must be recognized as readily as other more obvious infections are recognized. It is well to examine radiologically, as well as by other methods, the chests of all diabetic patients.

REGINALD FITZ, M.D.

PLENTY OF INSULIN

Plenty of insulin is now being manufactured by the Eli Lilly Company of Indianapolis, Indiana. As I understand it, any physician who will write them that he is acquainted with the uses and dangers of insulin and can arrange for satisfactory laboratory tests, will be able to secure it.

ELLIOTT P. JOSLIN.

News Items

CHANGE OF OFFICE.—Dr. Paul A. Hudnut has removed his office to 149 Elm Street, Northampton.

DR. JOSEPH RESNIK has changed his residence and office from 566 Blue Hill Avenue, Dorchester, to 484 Commonwealth Avenue, Boston.

DR. JOHN A. TURNBULL has removed his office from 520 Commonwealth Avenue to 491 Commonwealth Avenue.

DR. KENDALL EMERSON has accepted the chairmanship of the Worcester, Mass., Chapter of the Red Cross. Having been medical director of the Red Cross in Europe, Dr. Emerson brings to this Chapter a complete knowledge of the functions of this great organization, and under his leadership the Worcester Chapter will take on added vitality.

Dr. Ernest L. Hunt will be associated with Dr. Emerson as director of first-aid instruction and, *ex-officio*, a member of the Administration Committee.

Obituary

MARY ALMIRA SMITH, M.D.

THIS noted woman surgeon of Boston, retired for the past three years, died at Winthrop August 10, 1923, at the age of seventy-three.

She was born in Westfield February 10, 1850. After attending the local schools, she entered Mount Holyoke College in the class of 1872. Following graduation, a short time was spent in Westfield, during which she served as the first librarian of the Westfield Athenaeum. The following eight years were spent in study for her life work, two at Ann Arbor, Mich., and the other six at the University of Zurich, Switzerland, where she took her M.D. in 1880. Upon her return to America, she entered the New England Hospital for Women and Children in Boston as head surgeon, and continued in that capacity until 1918, doing a large amount of major and other surgery.

When she retired from the profession she received many honors in the medical world, and in 1912 Mount Holyoke College conferred upon her the degree of doctor of science.

In 1914 she was made a member of the American College of Surgeons. Since her retirement, she has made her home at St. Petersburg, Fla. She joined the Massachusetts Medical Society in 1887, her name being placed on the retired list in 1920. She is survived by three brothers, Edward B. Smith of New York, James M. of Providence, R. I., and Charles G. Smith of Boston.

DEATH NOTICES

DR. ERWIN G. SEYBOLD of Forest Junction, Wis., a recent graduate of the Harvard Medical School, died August 22, 1923, in Westboro, Mass. Death occurred while bathing in Lake Chauncey. Dr. Seybold was to have entered the Peter Bent Brigham Hospital November 1, next, as an intern.

DR. JOSEPH CHASE, a practitioner of East Weymouth, died August 23, 1923, at his summer home at Vineyard Haven at the age of seventy-one. He was a native of Boston, where he was born November 25, 1851, the son of Joseph and Clara L. Chase. Following his elementary education, which included the English High School, he spent five years in business, but in that interim he was instructed by a private tutor and entered Boston University Medical School, from which he was graduated in the class of 1878. Later he took a post-graduate course at the Harvard Medical School, and practiced at Hingham, later going to Concord, N. H., and then to East Weymouth, where he continued in practice from 1887 until a year ago.

Dr. Chase is survived by his widow and one son. He was a member of the American Medical Association, American Institute of Homeopathy, the Massachusetts Medical Society, the Norfolk District Medical Society, and the Massachusetts Homeopathic Medical Society, and he was a past master of Orphans Hope Lodge of Masons.

NOTICES

DIAGNOSIS OF TYPHOID FEVER

In order to help in the early recognition of cases of typhoid fever which may occur in Boston this season, the Boston Health Department, until further notice, will, on the request of an attending physician, make and report the result of a blood culture in any case of illness in which typhoid fever may be suspected. If desired by the attending physician, the Health Department will send a representative to visit the patient and take the blood specimen for culturing.

NOTICE CONCERNING THE PROGRAM OF THE CHILD HYGIENE SECTION OF THE AMERICAN PUBLIC HEALTH ASSOCIATION MEETING IN BOSTON, OCT. 8-11, 1923.

Of special interest to school physicians, nurses and teachers will be the Child Hygiene meetings to be held during the annual convention of the American Public Health Association at Boston October 8-11. Not only will there be papers and discussions dealing with various phases of school health work, but there will also be arranged exhibits of various kinds of school health work in connection with the Boston Health Show activities in the school system of Boston and some of its suburbs. It is urged that superintendents and principals call this program to the attention of school doctors, nurses and those teachers who are particularly interested in health education. The tentative program is as follows:

TUESDAY A.M.—OCT. 9

1. Teacher's Part in Health Education. Miss Maude A. Browne. (Title to be supplied).
2. Standardization of School Medical Inspection, Carl E. Buck, Dr. P. H., Epidemiologist City Department of Health, Detroit, Michigan
3. The Growth of Children, Wm. T. Porter, M.D., Professor, Comparative Physiology, Harvard Medical School, Boston, Mass.
4. Report of the Committee on Health Problems in Education, C. E. Turner, Associate Professor of Biol-

ogy and Public Health, Massachusetts Institute of Technology, Cambridge, Mass.

WEDNESDAY P.M.—OCT. 10

1. Health Standards for School House Construction and Sanitation, Louis I. Harris, Director Bureau of Preventable Diseases, City Department of Health, New York City.
2. The Place of Mental Hygiene in the School Program, W. L. Treadway, Surgeon, U. S. Public Health Service.
3. Some Phases of Nutrition Work (Title to be supplied), Alice Blood, Director, School of Household Economics, Simmons College, Boston, Mass.

THURSDAY A.M.—OCT. 11

1. The Surgical Problems and Convalescent Treatment of Crippled Children, R. G. Osgood, M.D., Boston, Mass.
2. The Crippled Child as a Public Health Nursing Problem, Edna Foley, Supt. Visiting Nurse Association, Chicago, Ill.
3. Breast Feeding from a Public Health Standpoint, E. J. Huenekens, M. D., Director Infant Work, Minneapolis Infant Welfare Society, Minneapolis, Minn.
4. The Virginia Plan for Health Education and Physical Training in Schools, Mary E. Brydon, M.D., Director Bureau of Child Welfare, State Board of Health, Richmond, Va.

JANE A. DELANO

A biographical sketch of Jane A. Delano, referred to at her death as the "most conspicuous woman of the World War," will be found in the August issue of the *Medical Woman's Journal*. Miss Delano was to her generation what Florence Nightingale was at an earlier time and under other conditions. Nor has her death lessened the influence she exercised over her compatriots, since the reforms she instituted in the nursing service continue to be in effect and are daily proving the wisdom of her judgment.

SOCIETY MEETINGS

DISTRICT SOCIETIES

September, 1923:—Meeting of Franklin and Hampshire District Medical Societies at South Deerfield.

Essex North—Combined Meeting with Middlesex North, Middlesex East and Essex South in October. Semi-annual Meeting at Haverhill, January 2, 1924. Annual Meeting at Lawrence, May 7, 1924.

STATE, INTERSTATE AND NATIONAL SOCIETIES

September 12, 1923:—New England Tuberculosis Conference at Worcester.

September 13, 1923:—Celebration of twenty-fifth anniversary of the Rutland State Sanatorium at Rutland.

October, 1923:—Boston Health Show will be held in Boston October 6-13, inclusive.

October, 1923:—Meeting of the American Health Association will be held in Boston, October 8-13, inclusive.

October 18-19, 1923:—Annual Meeting of New England Surgical Society in Boston.

For list of Officers of the Massachusetts Medical Society, see page xii of the Advertising Section.